



INDUSTRIAL AMERICA IN THE WORLD WAR



THE GENERAL STAFF OF AMERICAN INDUSTRIES IN THE WORLD WAR
THE UNITED STATES WAR INDUSTRIES BOARD IN SESSION

Left to right, seated: Rear-Admiral Frank F. Fletcher, representing the Navy; Robert S. Brookings, Chairman Price-Fixing Committee; Bernard M. Baruch, Chairman of Board; Hugh Frayne, representing Labor. *Left to right, standing:* Edwin B. Parker, Priorities Commissioner; H. P. Ingels, Secretary of Board; George N. Peek, Commissioner of Finished Products; J. Leonard Replogle, Director of Steel; Thomas Nelson Perkins, not of Board, but present at meeting; Alexander Legge, Vice-Chairman of Board; Gerard Swope, not of Board, but present at meeting; Major-General George W. Goethals, representing the Army; Albert C. Ritchie, General Counsel.

Leland L. Summers, Board Member and Technical Advisor, is not in group, but his photograph will be found opposite page 92.

INDUSTRIAL AMERICA IN THE WORLD WAR

The Strategy Behind the Line

1917-1918

By GROSVENOR B. CLARKSON

LATE DIRECTOR OF THE UNITED STATES COUNCIL OF NATIONAL DEFENSE

WITH AN INTRODUCTION BY
GEORGES CLEMENCEAU

And with Illustrations

Her [America's] brilliant, if pitiless, war industry had entered the service of patriotism and had not failed it. Under the compulsion of military necessity a ruthless autocracy was at work and rightly, even in this land at the portals of which the Statue of Liberty flashes its blinding light across the seas. They understood war.

VON HINDENBURG



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To the Memory of my Father
JAMES S. CLARKSON

PREFACE

THIS volume deals with the final, culminating, and decisive phase of America's mobilization and use of her industrial and economic resources in the World War.

This phase, of necessity, has to do with the United States War Industries Board in the full flower of its powers and performance. No attempt has been made to depict the preliminary industrial mobilization under the Council of National Defense other than to describe in high relief the evolutionary process, often dramatic, out of which came the War Industries Board in its final form.

Similarly, little or no appraisal has been made of the achievements or personalities of the hurried war preparations under the Council of National Defense and its subordinate bodies from six weeks before the entrance of the United States into the war until the autumn of 1917. This period may be treated in another volume, which would also, of course, include an account of the great field forces of the Council of National Defense under which operated the 184,000 units of the state, county, community, and municipal councils of defense throughout America, a machinery which transmitted to the people of the country the war measures and needs of the National Administration, sent back to Washington the moods and aspirations of the people, and maintained the morale of American citizenship from beginning to end of America's participation in the war. It would likewise contain a recital of the stirring and fruitful contribution of the women of America organized under the Council of National Defense.

In the present work, the writer has not only devoted many months of research into the official records to supplement and verify his own knowledge of the events described; he has, in addition, taken nearly 700,000 words of statements from the pivotal figures in the administration of the War Industries Board dealing with things and rendering conclusions of a substance and color that no official record ever

contains. Throughout, the greatest possible care has been exercised in statements of facts, a precaution imperative in the interpretative analysis of industrial and economic matters.

The present volume is in no sense a special pleading for anything or anybody. The writer has earnestly tried to deal with this particular bit of history in a just, detached, and objective manner. He has eliminated himself as much as possible from the narrative, departing from this course only when it has seemed useful to do so.

The writer acknowledges with much gratitude the coöperation extended to him by the great company of business men who moulded the work of which he writes. They have, without exception, given him the underlying facts that he desired, and given them to him candidly without seeking to influence his own analysis and appraisal of the events and achievements described.

The writer was irresistibly impelled to this recital because nowhere, in the Government or out of it, could he discern any adequate recognition of the services of these men — the dollar-a-year men, if the reader please — with whom he was associated in what were to him the most worth-while years of his life. The lack of appreciation of what they did and of the spirit that underlay their contribution is, in the writer's judgment, supremely unjust. He trusts that the following pages will in some measure illumine their quiet unselfishness and their tremendous deeds.

Finally, it is a matter of regret that in a history of this kind it is not possible to do justice to all of the personalities of the action. Their mere number precludes that, and the technical and specialized nature of the duties of very many of them would shroud any account in dullness and weariness for the general reader. The men who did the real work of the War Industries Board must, like the common soldiers in battle, remain largely unknown and unhonored.

The military historian has no choice in the tale of a battle but to italicize the victorious general and pass by and bury the individual soldier in the sum of casualties. So it is in this recital. Highly important but more obscure and unpretentious achievements must be unnoticed. Little can be done to offset this inevitable inequality than to preserve in the

Appendix the roll of the personnel of the War Industries Board and of vital bodies directly concerned with its work. These men were singularly heedless of praise or recognition, and they will understand. They worked as the best soldiers fought, *pro patria*; the strong and poignant satisfaction of honest service in an impelling hour was their chief reward, and, after all, there is no reward equal to that.

GROSVENOR B. CLARKSON

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INTRODUCTION

HERE is a good and useful book. There is no better school for nations than the school of truth, and it is never too early to lead them to it. The industrial history of the war has never yet been written. To it, Mr. Grosvenor B. Clarkson makes a first and most authoritative contribution. It is certain that no one of the victorious armies could have conquered but for the support of its industries. It is no less clear that no European industry could have survived but for the support of American industry.

All of us, without exception, make mistakes. Had we been better prepared for war, victory would have come sooner and cost less. As to military preparedness, our army was magnificent and admirably trained. But there was another kind of preparedness which had everywhere been neglected, that of the productive forces essential to the existence of the soldiers. One of the prime movers of American industrial mobilization spoke the truth when he said that "twentieth-century warfare demands that the blood of the soldier must be mingled with from three to five parts of the sweat of the man in the factories, mills, mines, and fields of the nation in arms." Germany, which, living only for the war, understood its requirements better than we did, had to pay dearly for unpreparedness. In the first quarter of 1915, she passed through a munitions crisis which was not far from being fatal.

America, despite the power of her production, only escaped the common danger by the magnificent effort of which Mr. Clarkson tells the story. As he so rightly says, America was the "last reservoir." We in Europe, when we lacked steel or high explosives, had only her to turn to. She, however, was obliged to find everything within herself, to meet her own requirements and satisfy the demands of her allies.

The competition of European and American needs was our constant anxiety. To cope with the danger, there was but

one hope: strong and constructive organization. Is there any need to add that in a nation of individualists like the United States such organization met with strong opposition from the very first? It will be the imperishable glory of President Wilson, Mr. Bernard M. Baruch, and their distinguished co-workers, that they were able to create it, as much by their convincing persuasiveness as by the exercise of unbending authority. The cables of my friend André Tardieu, who for two long years was responsible for the French side of Franco-American coöperation, had, from the beginning of the struggle, brought home to me the immense complexity of the difficulties encountered, the efforts made, and the results obtained. It is right, now that victory has been won, that history should speak through a book at once clear, interesting, and full of proof.

The United States declared war in April, 1917. It was only in March, 1918, that their industrial mobilization found its final form. Even in the land of quick decisions, the routine of peace days struggled hard to live. But the High Command of Industry was created. It was a splendid company of men who at the call of their country had come from all parts of the United States. It had no congressional birth certificate; a mere decision of the President, and in a few weeks resources were perfectly adapted to needs, the whole coördinated by the War Industries Board, which was supreme in all matters of production, priority, and distribution. It was really, according to Mr. Clarkson's forceful expression, nationally integrated industry.

Production, priority, distribution, was no easy task, and often strange and dramatic problems called for solution. To give but one instance: What was to be done with the lot of locomotives just ready for delivery? Were they to be sent to Pershing to carry his troops to the front, or were they to be sent to Chile to hasten the delivery of nitrates without which to-morrow the artillery would be dumb?

This book bears witness to what America achieved. Whoever reads it will know. But, leader of fighting France, I have a duty to fulfill. It is to recall here what in those immortal days the United States did for my country. That, too, would be worth a book, which has so far not yet been

written. Meanwhile, here are some eloquent figures. In eighteen months, the United States sent us five million tons of food supplies and five million tons of war material. The steel they sent us represented the raw material for a hundred and sixty million "75" shells. The foodstuffs they sent us fed twelve million Frenchmen for a year and a half. If this help had not been forthcoming, our army could not have held, the army of the United States could not have fought.

Mr. Clarkson is right: the men who won the war behind the lines — on which victory at the front depended — are entitled to the gratitude of the nations, and the nations do not even know their names. It is time that justice should be done these men, and this book hastens that day. We Frenchmen, who are eternally thankful, despite the troublous times through which we have lately passed, to our good comrades in arms from beyond the seas, remember with gratitude the organizers of the industrial victory, who made military victory possible. They have modestly gone back to their offices and factories, with the sole reward of duty well done. Let them receive our cordial thanks; they have deserved well of the Allied and Associated Nations.

G. CLEMENCEAU

PARIS, 13 *December*, 1922.

INDUSTRIAL AMERICA IN THE WORLD WAR

. . . I advise that the Congress declare the recent course of the Imperial German Government to be in fact nothing less than war against the Government and people of the United States; that it formally accept the status of belligerent which has thus been thrust upon it and that it take immediate steps, not only to put the country in a more thorough state of defense, but also to exert all its power and employ all its resources to bring the Government of the German Empire to terms and end the war. . . .

WOODROW WILSON

War Message to Congress, 2 April, 1917

Modern wars are not won by mere numbers. They are not won by mere enthusiasm. They are not won by mere national spirit. They are won by the scientific conduct of war, the scientific application of industrial forces.

WOODROW WILSON

Modern wars make terrible demands upon those who fight. To an infinitely greater degree than ever before, the outcome depends upon long preparation in advance, and upon the skillful and unified use of the nation's entire social and industrial no less than military power.

THEODORE ROOSEVELT

When this war comes to be reviewed in proper perspective, its social and economic aspects will be found at least as remarkable as the military events, and perhaps more instructive. And among them, the influence of war on industry and the converse influence of industry on war will take a prominent place. We are, indeed, witnessing a phenomenon so extraordinary and unexpected that we can only see its surface as we pass, and are hardly able to comprehend even that. There has not been time to look beneath and try to read the deeper meaning of it all. But some lessons present themselves which he who runs may read. Never before has the supreme concerted effort demanded by war been so fully brought out and the inscrutable mystery of human conduct been so clearly posed as in this prodigious conflict of industrial nations.

SHADWELL

Foreword to Readings in the Economics of War.
The University of Chicago Press, 1918.

Industrial America in the World War



CHAPTER I

THE CRISIS AND HOW IT WAS MET

The inexorable demands of modern war—A contest of peoples and industries as well as of armies—America the last reservoir of resources—The untold tale of the war—The Nation's inertia before the storm—Staging the huge industrial drama—Approximating autocracy.

WAR is no longer a phenomenon to which the military alone are called. It is no longer chiefly a pageant of marching troops and tragic fields. War to-day is a contest of all the powers of the antagonists—intellectual, moral, and industrial. To the romance of armed men moving upon the stage of history has been joined the drama of industry militant, of titanic economic forces loosed and then governed to the need of the nation in arms.

America sent oversea the last reserves of men. That was well and superbly done. But it would have been merely a magnificent gesture if America had not been the last reservoir of resources for the supply not only of herself but of the Allies.

The story of our changing and growing military programme and strength has been told by others, but the account of the industrial mobilization for war of an unwarlike, unprepared, and undisciplined people remains for this book. It is the untold tale of the war.

It is the record of how all the people and all their activities were drafted quite as importantly as were the four million youths who wore the uniform of the Republic.

It is a narrative of the gradual and unflinching conscription of the whole population for the manifold activities of modern war.

It is a story of the conversion of a hundred million comparatively individualistic people into a vast coöperative effort in which the good of the unit was sacrificed to the good of

the whole, and of how the entire industrial power and machinery of the Nation were focused on war ends.

Through the draft the army imperatively called to the colors the physically fit of the land. Through the War Industries Board, in embryo, in full form and vigor, and through its ever-growing and controlling ramifications with other war agencies, the whole productive capacity — even the whole civil life — of the Nation was just as certainly, if less imperatively, summoned to the ordeal.

At the head of the army in arms was the General Staff; at the head of the armies of industry was the War Industries Board.

So unobtrusively and so unconsciously did this powerful agency grow with doing, so naturally did it emerge with the environment, that it was never dignified with an organic act by Congress. The greatest exercise of national authority as applied universally and individually was entrusted to an instrumentality that was virtually unknown to the statutes, and it was not until the war had been over for some months that an investigating Congress began to understand something of the nature of the mechanism that in the end directed the sweeping appropriation of the commerce and industry of the most powerful of all nations more effectively and less timorously than like functions had been performed in the military nations of Europe.

It is of record that the reports of our military observers with the armies of the belligerents in Europe lay unread in the archives of the General Staff up to the time of our own entry into the World War. Funds had not been provided to furnish the military intelligence service with enough personnel to examine what little it was able to collect. As an organization our army had not been equipped to study the greatest of wars going on beneath its eyes. The cadets at West Point were still absorbing Jomini and Clausewitz, and the eyes of the General Staff were on the trivial Mexican Border, whilst the fate of the world was turning on the introduction of novel implements of war and unprecedented phenomena involved in a struggle that had become one of whole populations pitted against each other with the massed resources and facilities of peoples.

For at least two years we had been almost daily on the verge of being drawn into the war, but we had learned nothing from its military lessons in the narrow sense, and even less in the important sense of war as a conflict of nations. It is futile to attempt to place the blame for this lethargy in any other than the ultimate quarter of our confirmed and sentimental pacifism. Always believing that we shall have no wars, we have gone on having them without preparation ever since the war that founded the Republic. Even the upbuilding of the navy we have used as an excuse for no further preparation — saying that no war will ever be fought on our soil and that we shall never have need to fight overseas. That theorem has been demonstrated over and over again to the satisfaction of our stubborn devotion to peace; and is even now being explained to applauding audiences, though scarce four years have passed since we had two million fighting men in Europe.

Whether or not we have learned from our violent experience in the World War anything that will tend to make the trials of some future war less violent is an interesting field for dubious speculation, but, whatever may be the conclusion, it cannot divert interest from the history of what we did when war became an actuality and we had to suspend our absorption in pacifism to deal with a war that came despite our determination that it should not be.

Even if we had been a military people, we should never have grasped the universal involvements of modern war until we were actually in it. Germany alone among the nations had long ago seized in a powerful degree upon the idea that the army is but the sword of the nation, as ineffective in itself as a simple sword without a wielder. France was fully imbued with the conception of a nation in arms, but had not accepted its industrial implications. England was as laggard as we were when her hour struck.

Yet even Germany did not understand the full significance of a war of peoples. It is perhaps true even of her that she anticipated everything but what ultimately happened. She had long coördinated her internal life to the foreseen requirements of armies of unprecedented magnitude and fully understood the sequences of huge military efforts in the

industrial field, and conversely of the effects of industrial mobilization on military enterprises on the modern scale; but even she came short in her calculations as to the requirements of her armies from her industries and failed in foresight for civilian needs. Notwithstanding forty years of deliberate planning, she found herself improvising, reorganizing, and frantically starting to restore the disturbed balance as early as the first battle of the Marne.

For almost three years of the World War, our allies to be were so far from fully grasping the nature of the struggle that they were at first as uncertain as we were as to what should be our part in it. They hesitated as to whether we should be the store-house and power-house of the line or whether we should take a place in the line itself. It soon developed that we should have to play both parts, though not until the spring of 1918 did it become evident that in both soldier-power and material-power we should be compelled to play a large and decisive rôle.

Owing to our lack of preparation as well as to the particularistic attitude of our industries, partly due to the peculiarities of the American genius and partly to the operation of statutes that discouraged alliances of industrial units, the United States faced a very difficult task, even if it had been undertaken deliberately and long in advance of the emergency. There was no close coöperation in industry and no effective mingling of the national power with the industrial power. The American policy had been to repress interlocking industrial organization rather than to control it.

Trusts had been broken up and the tendency of the railways to unite had been vigorously opposed. All contacts of productive units were discouraged. There was an almost grotesque lack of centralized information concerning resources and facilities, and, of course, no prepared plan for devoting them to a struggle in which the military arms and the Nation itself were not to be distinguished. Even had there been an orderly and quickly available inventory of industrial power, there was no schedule of requirements against which to balance it. The measure of the application of our military and industrial power to the combat in Europe was the capacity of ocean transport, and that was an unknown

quantity. Moreover, the length of this line of supply necessitated the accumulation of far greater reserves than was the case with Germany, England, and France, which were in the theater of war. The transoceanic conduit must be filled and then kept full.

Our task was further complicated by the fact that we did not have the single problem of mobilizing our latent power into the power of arms backed by all the resources of the Nation. We were the last reservoir of energy and materials available to the Allies. Speaking in a broad way, we could not go elsewhere to obtain the things not immediately available at home. We had to find or produce them here without interfering with the flow of supplies to the Allies without which they would have been compelled to abandon the great struggle before we entered it. Not only that, but we had to attend to the enormous task of financing domestically our whole war enterprise and that part of the Allies' activities which depended upon American resources.

Upon us devolved the herculean work not only of meeting the special military requirements of ourselves and our allies, but of meeting the large alimentary deficits of the allied world and to some extent of the neutrals, besides seeing to it that our own people were adequately fed, fueled, and clothed. Our problem of industrial mobilization and application was thus vaster and more complex than that of any of the other nations at war. And it was thrust upon a people less prepared, by tradition, training, economic structure, political organization and control, and by forethought, to undertake it than was any other.

Even had all these elements been favorable, even had we already a large standing army well articulated to the "second line of defense," the vast area of the country, the long distances over which materials had to be moved in the process of preparation and for shipment to Europe, provided particular phases of the problem most difficult of solution. It is probable that no previously conceived and worked-out paper organization would have been able to meet a situation so novel and so permeating the whole life of the Nation, with incidence and repercussion not to be foreseen. It is even possible that such a preconceived organization might

have failed as much from its rigidity and formalism as our lack of system failed us at first.

It may even be that had we created, immediately upon our entry into the war, a department of munitions or its equivalent, it would have been too angular and inelastic successfully to meet the emergency, too autocratic for the liking of the country and of business, and far less adaptable and responsive to the facts of an ever-changing situation than the natural growth — the War Industries Board — which finally came to be the supreme instrumentality of the exertion and application of the power for war of the most powerful nation of all. There was an insistent demand for the establishment of a department of munitions, and it will long be an open question whether such a course would have been wiser than the one that was defined by the tread of events.

However, we are now concerned with history rather than with criticism. In the end the Republic met its problem — and effectively — through an institution that admirably complemented the genius of our people for the inductive method of thought and action. On the whole, we learn by doing instead of doing by learning. We act first and consider afterwards.

Lack of plan in no way interfered with energetic action when the war began. We plunged furiously into activity. Congress appropriated stupendous sums of money on the merest guesses as to requirements, inflated war establishments gave orders as fast as duplicating machines could copy them and telephone and telegraph transmit them. We struck blindly, we became enmeshed in our own complex web of activities, we stumbled and fell. And then, around a little nucleus of observation and reflection in the Council of National Defense that had sought to think, plan, and foresee from the late part of 1916, the lessons of experience were gradually deposited, and there grew up solidly and adaptively, finding final expression in the War Industries Board, a war machine that was our own and that articulated with the decentralization that characterizes the Republic, economically and politically, and that fitted like a glove the national devotion to individualism.

While the critics were still crying the need of system, the

system was evolving; and when coördination was still a sweet word to mouth in the way of advice, the manifold and inconceivably complex and interpenetrating demands and functions of war had been subdued, tamed, and harnessed in an efficient team. Through a fabric of reflex actions, responding to the multitudinous war stimuli, tempered by observation and thought, our war machine grew. Doubtless there might have been a better one, but this one did the job. It roped the wild horses of American economic and political tradition and habit and tied them into a mechanism of purposeful control that was not surpassed by the superimposed systems with which the Allies met the crisis of confronting for the first time in the history of the world a nation that was an army from the military front to the remoteness of the fields. Through it the huge, unwieldy, easy-going, individualistic, careless Colossus of the North became an army from its coasts to its placid farms, and learned to put into its blow the whole weight of its incomparable strength.

So gradual was the growth of this mechanism, so gently did it apply its powers, so lacking was the authoritative definition of them, so frequently did it request and so rarely did it command, so human were its engineers, so careful to protect the essential framework of the national economic strength while straining it to the utmost, so little was the emphasis of boastful publicity used, that but few of our people understand even now that the end of the war found the United States as complete a military machine throughout its whole industrial and economic life as the world has ever seen.

CHAPTER II

THE COUNCIL OF NATIONAL DEFENSE AND ITS ANTECEDENTS

Preparedness in a democracy—The roots of industrial defense—The Council's birth—Early gropings—First contacts with industry—The cry for concentrated power—The mass begins to move.

THE United States was unprepared for the World War in a governmental and military sense, but there had long been a ferment of preparation stirring among the non-official leaders. There is in this country a singular divorce at times between the public opinion and will and the acts of the Congress. Perhaps the divorce is more apparent than real, and that what we commonly call public opinion because it is so articulate is not the real opinion of the Nation.

At any rate, it has happened time and again that Congress has been obdurate to the appeals of the public as reflected by the views of the metropolitan press and symposiums of opinions of what we call the best minds. Judged by these indicia — and no historian should accept them without great reservation — it was the will of the people from 1914 on that the Nation should prepare for war. Yet it was not until 1916 that the Government felt justified in showing an active interest in military preparedness. Even in that year Congress thought that an army of two hundred thousand was enough.

It is a fair conclusion that the divorce between congressional action and public opinion is only between the former and apparent public opinion. Usually this apparent opinion eventually becomes the actual opinion — but a long time afterwards. After all, the controlling motive of most Congressmen is to shape their records to win the approval of their home people. Hence they watch their local public opinion most intently, and on any deliberately considered legislation are likely to represent the mass mind of the country.

Public opinion in New York, in Chicago, in Washington,

in the Capitol itself, and the public opinion of the Nation are two different things. We are a sprawled-out, decentralized nation, spread thinly over a continent, with the bulk of civil lawmaking and administration in the hands of local bodies. To the home districts State capitals usually loom larger than Washington and a county-seat fight is apt to be of more interest than a war in Europe. Under these conditions public opinion on national matters breaks up and recrystallizes slowly. When the provincial public mind is once made up, it tends to stay. It is not mobile. The Federal democracy follows its leaders at a distance. These leaders are not, as a rule, in Congress or in Government. Government depending upon popularity for its power seeks to follow rather than lead public opinion.

So, with war threatening for many years and impending for several, with the intelligently keen part of public opinion favoring preparedness and taking volunteer and non-official steps in that direction, we find little official action. While the agitation for action was largely fruitless in the immediate view, it had a great significance in that it did awaken thoughtful men everywhere to view the future with concern and to consider what could and should be done. By reason of this long impotent activity of minority opinion, the Nation was readier for heroic action when the time for preparedness had passed and that for action had come. It had glimpsed the stupendous scale of modern warfare and its intimate union with the whole life of the Nation, and so was in some measure ready to rally around the Council of National Defense as nucleus for the evolution of the supply machinery of the army and navy, which it was already vaguely understood meant the whole economic mechanism of the Nation.

As far back as 1910 the idea of a Council of National Defense had begun to take root in the minds of men who perceived how helpless the country would be in the event of war, for lack of forethought and planning, and General Leonard Wood and other army men were emphasizing the need even before that of more extensive military system. As long ago as 1902, General Crozier, as chief of the Ordnance Bureau, had urged the wisdom of a great enlargement of the artillery arm. Had the advice of the officers

been taken, and had the Government set about to plan for the expansion of the peace-time forces into an army of the size that was contemplated in Europe even before the revelations of the World War, the corollaries of such a course would have led to a large degree of industrial preparedness, though, as we now know, almost grotesquely inadequate. It really required a year's observation of the war in Europe for an understanding of the fact that modern wars are fought, not by armies, but by nations, and that the whole moral, spiritual, and physical energy of the Nation must be summoned to the struggle.

In the latter part of 1915 there began to be many popular manifestations of a tendency toward military and industrial preparedness, and many associations began to take form that had as their objectives some phase of preparedness. General Wood's "Plattsburgh plan" for training officers caught the imagination of the country and was later embodied in law. It is perhaps significant to note that the head of the war agency with which this volume deals was an early financial supporter of this plan.

All of the volunteer striving toward war preparation had at least a moral value in that they were preparing the mind of the Nation to face the war that was coming. One of them, at least, had a moral value, and that was the Industrial Preparedness Committee of the Naval Consulting Board. The first stirrings of the feeling of apprehension that we might be engulfed in the World War had their immediate reflexes in the naval establishment. It was obviously the first line of defense, and it was hard to conceive of any war that would require us to send large armies overseas. Moreover, for thirty years the public had become accustomed to an expanding navy and mounting appropriations for naval ships and establishments. So, in 1915, President Wilson unequivocally declared for a navy second to none, and there was laid down the ambitious building programme of 1916 which pointed to supremacy for the American navy. The extensive industrial involvements of this programme were obvious. With Edison at its head, the Naval Consulting Board, created to deal with them, consisted of two members each from eleven of the great scientific societies of America.

Responding to the growing apprehensions of the hour, this Board soon concentrated its important activity in the Committee on Industrial Preparedness, which extended the scope of its work to include industrial preparedness as viewed from the whole military requirement, not that of the navy only. Although acting under helpful public auspices and with the emphatic approval of the President, the Industrial Preparedness Committee was virtually a popular rather than a governmental organization. It was almost wholly financed by private contributions. The chief work of the committee, under the chairmanship of Howard E. Coffin, of Detroit, was to make an inventory of manufacturing plants of the country that were capable of making munitions.

The State committees, hand-picked from the joint membership in each State of the five leading engineering bodies of the country, took up the work with vigor and enthusiasm, and the enterprise proceeded so rapidly that by September, 1916, some twenty thousand manufacturing plants had supplied data bearing on their war service capabilities. This canvass revealed a very general feeling on the part of manufacturers that America would be drawn into the World War. They sensed the strain that would be put upon the country's industries and (doubtless in some cases stimulated as the result of Allied contracts) cheerfully coöperated in the census of preparedness. Yet it must be noted that there were a few exceptions. Some concerns refused to give the desired information, and curtly stated that they cared for no governmental patronage either in war or in peace. This exceptional attitude revealed a considerable lack, in the year before the war, of that unity of will to serve the Nation that was essential to the fusing of the fagots of individualism into the unbreakable bundle of national unity.

Whatever may have been the value of the committee's industrial inventory, to Mr. Coffin, more than any other individual, is due the evocation of the pre-war movement for industrial preparedness, so far as its popular aspect was concerned. He gave his time, energy, and resources without stint. He was filled with the consciousness of the preponderant rôle of industry in modern warfare, expressed in his phrase: "Twentieth century warfare demands that the

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blood of the soldier must be mingled with from three to five parts of the sweat of the man in the factories, mills, mines, and fields of the nation in arms."

The information collected by this private endeavor to fill the gap that Congress had long ignored was later transferred to the Council of National Defense and War Industries Board — the latter expanding the inventory threefold; but still more important was the awakening of the men of industry and the thoughtful citizenry that resulted from the canvass and the knowledge of the importance of the articulation of arms and industry in modern war that was widely disseminated. The phrase "industrial preparedness" was born of this campaign. The press of the Nation gave many thousand columns of space to the committee's work during the summer of 1916. Magazine editors like Albert Shaw, of the "Review of Reviews," daily newspaper executives like George McAneny, of the "New York Times," made themselves one with the movement. The billboards gratuitously blazoned the idea, and such powerful national organizations as the Associated Advertising Clubs of the World and the American Press Association contributed generously of their talent and experience, as did a number of the leading artists of the country. In no small measure was the ground thus prepared for the seed that was to be so vigorously planted in the following year.

The feeling for industrial preparedness that was fostered undoubtedly had its effect in Congress when, in the spring of 1916, bills were again introduced into the House and Senate for the creation of a Council of National Defense. The idea was now in the air. The President, now become an ardent advocate of preparedness, had made a swing around the circle to promote the enlarged naval and military programmes, and the people, realizing how near war came after the sinking of the *Lusitania* and again after that of the *Sussex*, understood that some new incident might precipitate it almost any day. The German intrigues for the support of pacifism and for the destruction of munitions plants stirred national resentment, and helped, as did much of Germany's policy, to contribute to her undoing. Yet, even now, so pacific was the Congress that the section of the

Military Appropriations Act creating the Council of National Defense was drawn with a view rather to leisurely industrial preparation for some far-off emergency, and the trifling sum of \$200,000 was the amount held sufficient for a beginning. Under consideration in Congress for near six months, the plan became law only of August, 1916, and it was not until December 6th that the Advisory Commission of the Council held its first meeting.

Many men and many currents of thought contributed to this first enactment of a measure designed to enlist the economic forces of the country for some distant emergency. The apical effective touch was apparently given by Dr. Hollis Godfrey, president of the Drexel Institute of Philadelphia, and Dr. Henry E. Crampton, an eminent scientific man, who as thoughtful citizens sought an analogy between corporate coördination and the coördination of the political power and the industrial strength in an emergency that would demand their closest union.

Dr. Godfrey states¹ that the sources of his thought on this subject had their origin in a trip abroad in 1906 during which he met Sir Henry Campbell-Bannerman and Mr. Winston Churchill, who were then "working on a council of imperial defense" for Great Britain. He watched with interest the course of the Hobson proposals in Congress for a Council of National Defense, and then in May, 1916, made up his mind that he must do something to promote the idea of management of industry in relation to war, for the purpose, as he put it, of getting "product and service at a minimum of cost and time." He conferred with General Leonard Wood. "Three cheers; this is exactly what we need," was the comment of the great proponent for military preparedness in the United States. "There is nothing that is more necessary."

In several conferences with General Wood, the whole preliminary plan was worked out, and General Wood recommended that Dr. Godfrey confer with Secretary of War Garrison. Before calling on Secretary Garrison, however, Dr. Godfrey conferred with Secretary of Commerce

¹Testimony before Select Committee on Expenditures in the War Department, Serial 3, Part 15, October 20, 1919.

Redfield and Dr. Crampton, and there resulted a working model of the Council of National Defense. When the plan was submitted to Mr. Garrison, he said, "This is the most amazing baby that was ever put on the War Department steps; I am going to shut everything else off and talk to you the rest of the day." After many other consultations the project was submitted to Elihu Root, former Secretary of War, who examined existing statutes and informed Mr. Garrison that there was no existing organ of Government that could carry out the plan, and then "outlined the bill which afterwards formed the fundamental principles of the bill."

The next step was the submission of the basic bill to Representative Sanford, of New York, and then to Senator Weeks. Senator Chamberlain, chairman of the Senate Committee on Military Affairs, and Representative Hay, chairman of the House Committee on Military Affairs, gave earnest attention to the project. Colonel House reviewed it with valuable results and then the plan was laid before President Wilson, who said: "This is admirable; this is extraordinary, this composite work. It is exactly the putting of this theory of education into government. I am heartily for it." Secretary of War Baker was consulted frequently by Crampton and Godfrey and he agreed with the whole situation.

The provisions of the Army Appropriations Act creating the Council of National Defense were drawn by Major-General Crowder acting under instructions from Mr. Baker. The first draft was brought to the Secretary, changed by him in several ways, then restudied and redrawn by General Crowder, and in its final form was the result of further conferences between General Crowder and Mr. Baker. The original basic blue-print work in connection with the Council was apparently done by Dr. Crampton and his staff. It should be said that in the course of his thinking and planning Dr. Crampton received the views of such men as Benjamin Strong, governor of the Federal Reserve Bank at New York; Nicholas Murray Butler, president of Columbia University, and Elihu Root. In view of later critical discussion, it is significant that Dr. Godfrey testifies that it was Mr. Root's



THE UNITED STATES COUNCIL OF NATIONAL DEFENSE AND ITS ADVISORY COMMISSION IN JOINT MEETING IN THE GREAT ANTEROOM OF THE SECRETARY OF WAR, SPRING OF 1917

Left to right, seated: David F. Houston, Secretary of Agriculture; Josephus Daniels, Secretary of the Navy; Newton D. Baker, Secretary of War and Chairman of the Council; Franklin K. Lane, Secretary of the Interior; William B. Wilson, Secretary of Labor. *Left to right, standing:* Grosvenor B. Clarkson, Secretary (later Director) of Council and Advisory Commission; Julius Rosenwald, Bernard M. Baruch, Daniel Willard, Chairman of Advisory Commission; Dr. Franklin H. Martin; Hollis Godfrey; Howard E. Coffin; Walter S. Gifford, Director of Council and Advisory Commission.

The functions of advisory commissioners will be found on page 17. William C. Redfield, Secretary of Commerce, of the Council, and Samuel Gompers, of the Advisory Commission, are missing from the group.

suggestion that the Council of National Defense should consist exclusively of certain Cabinet members.

William G. McAdoo, Secretary of the Treasury, bore a distinct part in the Council's creation. He was keenly interested in it. At his summer home in New Jersey, the writer discussed with him at great length, in September, 1916, the personnel of the Advisory Commission shortly to be appointed, the writer having been, with Walter S. Gifford (the first director of the Council), one of the working heads of Mr. Coffin's Committee on Industrial Preparedness. Following this meeting the writer informed Mr. McAdoo that he could not accept the directorship of the Council and Advisory Commission and advised the selection of Mr. Gifford for that post, one which held potentialities limited only by the vision, practical ability, and courage of its incumbent. (Mr. McAdoo told the writer then that he had had the Secretary of the Treasury as a member of the Council kept out of the act because he did not feel he could assume the additional work.) Mr. Gifford seemed to be a logical selection to undertake the preliminary organization of the Council. As supervising director of Mr. Coffin's committee, he had organized and driven through the details of the work in an orderly and precise manner that was wholly admirable. He was besides possessed of considerable business experience as chief statistician of the American Telephone and Telegraph Company.

The Advisory Commission, which was the characteristic feature of and became the Council in action and was the essential part of its mechanism, is represented by Dr. Godfrey as being "the joint growth of the entire situation; the Advisory Commission was to bring out the principle of having trained experts in different lines. It had never been very effectively brought into an executive body before."

It is important to note that the legislative roots of the Council of National Defense idea go back as far as 1910. In that year, in response to a resolution of the House of Representatives, the General Staff of the army submitted to the House a confidential report on the military situation which included a recommendation for the creation of a Council of National Defense, "in order to stabilize the mili-

tary policy of the United States." Even then there seemed to be an understanding in the army that there must be a body to unite the military and civil forces.

Immediately after this report was received, Richmond Pearson Hobson, of the House Committee on Military Affairs, introduced a bill providing for a Council of National Defense to consist of the Secretaries of War and Navy, two technical officers each from the army and navy, and six members of Congress. This early idea that the Council should primarily unite the military arms of the Government with the Congress persisted right down to 1917. Mr. Hobson brought his bill up again in the Sixty-Second Congress in 1912, but it never reached a final vote. The matter was considered important enough even to be included in the Democratic national platform in 1912, which had a clause expressing approval of such a body. The proposal was unavailingly renewed in the Sixty-Third Congress, and the matter was discussed in newspapers and magazines in 1913 and 1914.

The outbreak of the war in Europe with its early emphasis on the industrial incidence of war shifted interest from the earlier conception of a council that would unite the army, the navy, and the Congress in a military coördinating body to one that would deal rather with the relations of the military arms to industry. Thus arose the Naval Consulting Board; the National Advisory Committee on Aeronautics, created in March, 1915; the National Research Council, created in July, 1916, both by acts of Congress, and in April of the same year the establishment of the National Committee of Physicians for Medical Preparedness.

The growth of interest in the industrial background of military operations was reflected also in section 120 of the National Defense Act, which gave the President the power to "place orders for war material directly with any source of supply" and also endowed him with the power to commandeer plants if necessary and appoint an industrial mobilization board. The same section directed the Secretary of War to cause to be made a complete list of all privately owned plants equipped to manufacture arms or munitions, etc. The power here given was intended to be used through

the War Department, but another act gave similar powers to the navy. Section 120 was worked out by the War College Division of the General Staff Corps.

Preliminary to the final adoption of the section creating the Council of National Defense in the Military Appropriations Act of 1916, four separate bills for such a body were introduced — two by Senator Chamberlain, one by Representative Hay, and one by Representative Britten. In substance Mr. Hay's bill (the Godfrey plan) was finally adopted, as it appeared to represent the more modern conception. Senator Chamberlain's measures inclined to the earlier tradition of a sort of fusion of the legislative and executive branches.

Nevertheless, the measure as finally adopted attracted little attention from Congress as a whole, and nobody seems to have thought that there was any duplication of legislation involved in the above-mentioned paragraph of the National Defense Act, passed by the same session of Congress which authorized the President to appoint a board of industrial mobilization in his discretion. Had there been any general adequate thought given to the subject, the two measures would have been merged logically in the National Defense Act, but in fact it was the Military Appropriations Act that provided for the Council of National Defense. It is a curious fact that there is no record that the authorization of an agency for industrial mobilization was ever invoked by the Executive, though that provision has been noted since as one of the elements that built up the extraordinary war powers of the President and supplied the sources of authority for much that was done later by the Council of National Defense and the War Industries Board. It seems entirely to have escaped the attention of those unfriendly critics who have sought to show that there was virtually no legislative foundation for the exercise of such vigorous executive power as the War Industries Board came to exercise in the fulfillment of its evolution.

Necessity knows no law, as President Lincoln telegraphed to Governor Ramsey, of Minnesota, when the latter besought him to suspend the draft in Minnesota, which sparsely settled frontier commonwealth was at the moment confronted by one

of the bloodiest Indian wars in our history. Congress never contemplated that the Council of National Defense and its lusty child, the later all-powerful War Industries Board, should become the partners of the army and navy in waging war, but it did sow the legislative seeds from which those bodies grew great and mighty when endowed with the virtually unlimited authority that the President in war-time could and did confer upon them. In any event, the evolution had the tacit approval of Congress, for, though definite legislation covering the field of industrial control in connection with the war enterprise was proposed, it was never adopted.

Perhaps it is just as well that the instrumentality of primary industrial control was left to grow instead of being created. Being always in some measure, superficially at least, dependent on the voluntary coöperation of the people, it never aroused the deep-seated antagonism and open or passive defiance that, in a democracy, so often cripples arbitrary and unpopular ordinances. Moreover, by reason of its indefiniteness, the system that finally met the emergency was so adaptive and fluid that it fitted into all the crannies and crevices of the war machine which was called upon to do more in two feverish years than the one Germany built with thought and care in forty deliberate years. A formal instrumentality legislatively created *ab initio* might have accomplished less by severe edicts than the War Industries Board did by its polite "requests." Edicts might have been nullified, but the requests were ever cheerfully complied with. By the legislatively informal method the necessary measures were always taken by "us" instead of by "you." And there is a world of psychological philosophy in the difference. It matters not that recipients of the requests for coöperation knew that behind them there was inexorable will and the means of compulsion; the request form made them feel that the sources of power and compulsion were ultimately in them as an integral part of the Nation from which the requests proceeded.

The act creating the Council plainly reveals that it was intended as a peace-time body which should prepare the country for an emergency — by thought rather than by

action, by study rather than by performance. Doubtless it was expected that its recommendations should be the basis of legislation that would create instrumentalities for the purpose of realizing its plans. The war caught the new body in the formative state and wrought it by the imperious force of events and the white heat of necessity into an executive agency. Instead of planning the initial mobilization of industry and resources, it directed the mobilization. Instead of sitting serenely apart in a deliberate council chamber, it was thrust by forced evolution into events that could not be stayed.

Congress never saw fit to change the organic act when the emergency arrived; it was satisfied to let evolution take its course. The job of the early war days had to be done and the Council was doing it, better perhaps than if executive powers had been conferred on it by precise and rigid statute; though the men of action who were ultimately to direct its indispensable functions often deplored the lack of "teeth" behind their efforts. Although overemphasizing the peace-time value of the Council, doubtless because he did not wish to emphasize preparatory war measures in the delicate days of the latter part of 1916, President Wilson, in announcing the appointment of the Advisory Commission of the Council, broadly stated the purposes of the Council in the following words:

The Council of National Defense has been created because the Congress has realized that the country is best prepared for war when thoroughly prepared for peace. From an economical point of view there is now very little difference between the machinery required for commercial efficiency and that required for military purposes. In both cases the whole industrial mechanism must be organized in the most effective way. Upon this conception of the national welfare, the Council is organized in the words of the act for "the creation of relations which will render possible in time of need the immediate concentration and utilization of the resources of the Nation."

The organization of the Council likewise opens up a new and direct channel of communication and coöperation between business and scientific men and all departments of the Government, and it is hoped that it will, in addition, become a rallying point for civic

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bodies working for the national defense. The Council's chief functions are:

1. The coördination of all forms of transportation and the development of means of transportation to meet the military, industrial, and commercial needs of the Nation.
2. The extension of the industrial mobilization work of the Committee on Industrial Preparedness of the Naval Consulting Board. Complete information as to our present manufacturing and producing facilities adaptable to many-sided uses of modern warfare will be procured, analyzed, and made use of.

One of the objects of the Council will be to inform American manufacturers as to the part they can and must play in national emergency. It is empowered to establish at once and maintain through subordinate bodies of specially qualified persons an auxiliary organization composed of men of the best creative and administrative capacity, capable of mobilizing to the utmost the resources of the country.

The personnel of the Council's advisory members, appointed without regard to party, marks the entrance of the non-partisan engineer and professional man into American governmental affairs on a wider scale than ever before. It is responsive to the increased demand for and need of business organization in public matters and for the presence there of the best specialists in their respective fields. In the present instance, the time of some of the members of the Advisory Board could not be purchased. They serve the Government without remuneration, efficiency being their sole object and Americanism their only motive.

The men thus appointed to the Advisory Commission — Daniel Willard, president of the Baltimore & Ohio Railroad; Bernard M. Baruch, financier; Howard E. Coffin, vice-president of the Hudson Motor Company; Julius Rosenwald, president of Sears, Roebuck & Company; Dr. Hollis Godfrey, president of the Drexel Institute of Philadelphia; Samuel Gompers, president of the American Federation of Labor; Dr. Franklin Martin, secretary-general of the American College of Surgeons, Chicago — little thought that they were so soon to become the head center of the thought and action of the Nation on its civil side, nor that they, serving without pay, would soon be marshaling the forces of the world's greatest industrial nation.

In the nature of things the Advisory Commission of the

Council of National Defense became the real executive branch of the Council. The Council proper was made up of the Secretary of War, who was elected chairman, the Secretary of the Navy, the Secretary of the Interior, the Secretary of Agriculture, the Secretary of Commerce, and the Secretary of Labor. It is true that the Council early distinctly affirmed that the duties of the Advisory Commission were advisory and that the power of decision lay with the Council, thus conforming to the letter of the law; but the initiative lay with the members of the Commission and the Council inevitably came to accept its advice, and it was then charged with the execution of the things decided upon. Counsel and action united usually have their way under any executive. Hence it is true that in effect the seven members of the Commission, continuously occupied with the business side of war, were really the men who primarily shaped and directed the illimitable and multitudinous contacts of the Government with industry, business, and the daily life of all the people.

The minutes of the Council and of the Commission show that in the beginning no member foresaw what was to eventuate from the early gropings of this group of men, who vaguely realized that something vast and far-reaching must be done if the untrained strength of the sleeping giant of America was to be concentrated in the effort that should win the war. From being a body of thinkers and directors of research, compilers of data and makers of inventory, who knew that in some way the things they recommended must be done, the Commission became the nucleus of ramifying committees, commissions, and boards which proceeded to do the things advised.

It would be interesting to trace all the way through the evolution of the Commission from a group of somewhat bewildered men drawn from private life (meeting for the first time in a hotel room December 7, 1916) and with little experience in or knowledge of the workings of the machinery of government; but that would be to write a history of the Council of National Defense, and we are here concerned directly only with the Council's early history in so far as what subsequently became the War Industries Board was then

embryonically acting. But, inasmuch as the War Industries Board in all commercial and industrial matters eventually became the master key of all the economic functions that grew out of the Council or the Advisory Commission, it is well to consider what it did in those early days of growth and differentiation. Perhaps the most striking, concise account of the Advisory Commission in the first three months of its existence was made by a partisan critic, the Honorable William J. Graham, who, after examining the minutes of the Council and of the Advisory Commission of the Council, which up to that time had been regarded as confidential, but which the writer turned over to him on request, reported to the Select Committee of the House of Representatives on Expenditure in the War Department (of which he was chairman) what he called a "startling disclosure" of the "secret government of the United States."¹

An examination of these minutes [he said] discloses the fact that a commission of seven men chosen by the President seem to have devised the entire system of purchasing war supplies, planned a press censorship, designed a system of food control and selected Herbert Hoover as its director, determined on a daylight-saving scheme, and in a word designed practically every war measure which the Congress subsequently enacted, and did all this behind closed doors, weeks and even months before the Congress of the United States declared war against Germany. . . .

It appears from the minutes of the Advisory Commission and the Council, which were kept separately, that practically all of the measures which were afterwards considered as war measures were initiated by this Advisory Commission, adopted by the Council, and afterwards acted upon by Congress. In many cases, a considerable period before the actual declaration of war with Germany, this Advisory Commission was discussing matters which were thought to be new legislation by reason of the necessities of war. For instance, on March 3d, over a month before the war declaration, the Advisory Commission endorsed to the Council of National Defense a daylight-saving scheme and recommended a Federal censorship of the press. . . .

On February 15th, about two months before the declaration of war, Commissioners Coffin and Gompers made a report as to the exclusion of labor from military service, and the draft was dis-

¹July 7, 1919, Serial 1, Part 7, of the Committee's hearings.

cussed; the draft was also discussed on other occasions before any one in this country except the Advisory Commission and those who were closely affiliated with the Administration knew that a declaration of war was to be later made. At a meeting on February 15th this same commission of seven men (none of whom had any official authority except as advisers) recommended that Herbert Hoover be employed by the Government in connection with food control. It was generally understood, as appears from the minutes, that Mr. Hoover was to be in control of the matter, although the war was two months in the future. . . . Almost the first thing the Commission did was to take up the matter of arranging an easy method of communication between the manufacturers and the Government. . . . In several meetings long before the war was declared this Advisory Commission of seven men met with the representatives of the manufacturing industries and formed an organization of them for selling supplies to the Government, which organization was well perfected before the war was declared. This method consisted of having the representatives of the various businesses, producing goods which the Government would have to buy, form themselves into committees so that they might be able to sell to the Government the goods direct, which their industries produced. In almost every meeting that this Advisory Commission held before the declaration of war, they discussed and recommended to the Council (which consisted of six Cabinet members) these plans for fixing prices and selling to the Government. When war was declared on April 6th the machinery began to move, headed by the Advisory Commission of seven men, who were, in effect, as shown by these minutes, the active government of the United States so far as the purchase of supplies was concerned. So far as I can observe, there was not an act of the so-called war legislation afterwards enacted that had not before the actual declaration of war been discussed and settled upon by this Advisory Commission.

It is an interesting commentary on the responsibility of statesmen in a democracy that a distinguished Congressman should affect to think that he was making a startling sensation out of a presentation of the obviously necessary preparations for a war that was apparently inevitable months before the formal declaration. According to Mr. Graham, while it was reprehensible enough to have done anything a day before Congress formally decided that there was to be war, the iniquity of the proceeding was that the Advisory Commission, in addition to advising, took steps to see that

its recommendations, after approval by the Council, were put into execution.

The only fault, aside from its bitterly depreciative tone, to be found with Mr. Graham's summary of the achievements of the Advisory Commission before and in the early days of the war, is that, broad as it is, it does not tell the whole story. And it might be added that the only cause the Nation has for regretting what was then done is that it was not even more inclusive, specific, and compelling.

On the other hand, it might be inferred, from Mr. Graham's graphic, if unfriendly, summary, that the Advisory Commission had from the very first a deep and orderly understanding of the national problem, a clear conception and an adequate programme of how to undertake its solution. Such was not the case. In fact the minutes show, as might be expected, a distinctly experimental, tentative, and cautiously explorative attitude through the first two months (and permanent organization waited for three months). Save in one or two directions, a month passed before the commissioners began to get hold of concrete phases of the problem.

At the meeting of January 8th, out of much talk and many suggestions came two practical suggestions that were destined to grow into great realities. Commissioner Daniel Willard "brought to the attention of the meeting the importance of the development of ideas about railroad transportation and suggested that an investigation should be undertaken through such means as seemed most appropriate for the purpose of developing in what way the railroads can be beneficial to the Government." This recommendation was adopted and Mr. Willard was appointed to make the investigation. This was the first seed of the Government Railroad Administration.

The other suggestion came from Commissioner Baruch, and was really the first stirrings of life in what was to be the War Industries Board of a year later. Commissioner Baruch stated that he had been making a study of the steel and metal industries, and wanted to consult further with the authorities in those trades if the Commission felt that it was perfectly proper for him to go ahead. He had not been doing it as a member of the Commission and would not

necessarily need authority, but he wanted to feel that the Commission desired him to go ahead and bring from the suggestions of those trades an understanding of what they could do — *how to get their resources together*.¹ The suggestion was approved and Mr. Baruch was authorized to proceed.

In a broad way of speech that was the task of the management of industry in the war — to get the country's resources together. The logical place for the initiation of the getting together was in the basic industries — the industries that produced raw materials. Until the proper point of starting was generally understood, the control of industry was never rationally approached. The War Industries Board in its intermediate and final forms was the lineal descendant of the Council's dealings with raw materials, though chronologically it took its first recognized form in the General Munitions Board. It took time for the fundamental conception to prevail, and that meant the losing of time. Yet nothing seems more obvious than that in the last analysis everything pertaining to production rests upon the supply of raw materials and the methods of utilizing them. As an expert appraiser of the values of securities, Mr. Baruch had early learned in a successful business career to go to the roots of all enterprises that sought the investors' dollars. His experience and turn of mind naturally prompted him to seek for the control of the mobilization of national industrial strength in the first sources — in the primary materials and in transportation.

It was not easily to be foretold, in the early days when the plasm of industrial mobilization had just been created, what, if anything, worth while would come out of it. None foresaw that the "Wall Street speculator" who manifested such an interest in raw materials would eventually become the head of the controlling body of the whole industrial side of the war effort. Evolution, in social organisms at least, is diverted as easily as a rivulet by a snag. Time and chance play a great part. Not always do the man and the opportunity meet.

The easiest and most direct route of evolution would

¹Italics are the author's.

seem to have been for the chairman of the Advisory Commission or the director of the Council of National Defense to have shed his associates and emerged as the industrial dictator at a time when every one was weary of conferences and committees and longing for some strong man, with temperament suited to the times, to take the reins. The Chamber of Commerce of the United States at one time, perceiving that there should be an industrial command co-equal with the military command, recommended to Congress that the director of the Council should be given power and authority in the economic field analogous to that of the chief of staff of the military field. If, in the summer of 1917, an executive genius had, with or without permission, injected himself into the situation, he might well have become the man of the hour, and the tedious and agonizing evolutionary process would have been shortened by at least six months.

At the joint meeting of the Council and the Advisory Commission, held on February 12, 1917, we find in a resolution originating with Secretary Lane the first formal statement of the idea of direct contact with the chief men in industry that Mr. Baruch had already been applying in his voluntarily undertaken work and which he had been orally presenting to his Federal associates. This resolution provided for the calling of a series of conferences "with the leading men in each industry fundamentally necessary to the defense of industry in the event of war, at which conferences these men shall be asked to organize themselves so as to deal with the Council through one man or through a committee of not more than three men to whom the Council shall submit such problems as may affect such industries. That the Secretary of War shall designate one or more members of the Council or Commission to meet with such conferences and set forth the desire of the Government and its prospective needs."

This resolution resulted, at a subsequent meeting of the Commission the same day, in a recommendation that the Commission be organized into committees, each member being a chairman of one committee and the other members being designated by him "from either governmental or civil

life, or both." Here we have the first definite step toward the system of committees and sub-committees which brought the Government into contact with the whole productive and distributive life of the Nation and became the basis of the system of democratic control of industry through personal conference and discussion, which reached its mature form in the commodity sections of the War Industries Board in connection with the complementary committees from industry. The Commission was accordingly divided into committee chairmanships as follows:

Daniel Willard, transportation and communication.

Bernard M. Baruch, raw materials, minerals, and metals.

Howard E. Coffin, munitions and manufacturing (including standardization) and industrial relations.

Julius Rosenwald, supplies (including clothing), etc.

Dr. Hollis Godfrey, engineering and education.

Samuel Gompers, labor (including conservation of health and welfare of workers).

Dr. Franklin Martin, medicine and surgery (including general sanitation).

Three of these committee assignments were many months afterward to merge in whole or in part into the War Industries Board; namely, that of raw materials, minerals, and metals, that of munitions, manufacturing and industrial relations, and that of supplies. Out of the labor assignment came the Labor War Administration of the Department of Labor; out of transportation and communication came the war administration of railways under governmental control and operation. In addition, out of these or other committees or determinations of the Council grew the Food Administration, the Fuel Administration, the Aircraft Production Board, and other extraordinary war-time agencies of Government.

The next step in the evolution of what was to be the War Industries Board was taken when Commissioner Baruch reported to the joint meeting of the Council and Commission, on March 24th, a synopsis of the committees he had determined upon in his department, some of the members of which were already named.

The committee designations reported at that time were leather, rubber, steel, wool, nickel, oil, zinc, coal, and spruce wood. At the same time Mr. Baruch reported:

As a result of your committee's discussion with the Secretaries of War and Navy and the copper producers, a contract is about to be entered into between these departments and the copper producers for the copper that they state as their requirements at what your committee considers a very fair and reasonable price.

The committee is also in the process of negotiations with other producers of raw materials which are to be used for the Government, that we believe will result in most favorable terms to the Government, such as zinc, lead, and steel products.

The committee has, at the request of Secretary Redfield, taken up the matter of increased output of cans and tin plate. The canning and tin plate people have given assurances of their active coöperation.

This report shows the Advisory Commission in practical business contact with industry for the first time. It is noteworthy, too, that at the same time Mr. Baruch's report showed how rapidly his dealing with raw materials was bringing him into contact with all of the elementary phases of industrial control for war purposes. Referring to transportation as he had come across it in his work, he said, "This industry is basic to all others."

The report also dwelt on the fact that "there are certain raw materials which are absolutely necessary which are not produced in this country, and which I think should be kept in sufficient quantities by the Government itself. Among these, it is of prime importance that we have a two years' supply of nitrate of soda until the artificial production of nitric acid is proven. Rubber, none of which is produced in the United States, and for which no substitute has yet been found, is another."

As we are about to proceed on the evolutionary tangent that takes us away from the Council of National Defense, it will not be out of place to note how hard the Advisory Commission strove to awaken the Government and energize it into thought and planning for the impending conflict, and to give some glimpse of the obstacles that it had to contend with.

The National Defense Act of 1916 was in some respects rather a national offense. Purporting to be a preparedness measure, it included the narrow provision that not more than half of the officers of the General Staff should be in

Washington at one time. The fear that officers might be located in Washington for personal and social reasons rather than the needs of the service moved Congress to provide that, with war menacingly booming on the horizon, the military planning body could not even mobilize itself. This limitation of the Staff in numbers only to officers and in funds next to nothing undoubtedly resulted in the almost incredible circumstance that even six weeks before war was declared the army had not even hypothetical plans for the organization and equipment of a force of any size. Not only that, but it did not even have a formula for undertaking such a task. It actually remained for the Council of National Defense's Advisory Commission, a purely civilian body, to take the initiative (February 15, 1917) in calculating what the raising of an army of one million men would involve in the way of material.

It appeared that it was impossible to get the information from the army in the desired detail, and so, at the instance of the Advisory Commission, a retired officer, Colonel J. F. Reynolds Landis, made a rough estimate for submission to the General Staff for review and revision, which was made by General Joseph E. Kuhn, then head of the War College, on March 15th — just three weeks before war was declared. The General made this comment, which reflects at once the financial timidity of those holding the purse-strings on the eve of war and that officer's comprehensive perception of the incidence of modern warfare:

It should always be remembered that, although the cost of the original equipment for one million men may seem excessive, *in fact nearly prohibitive,*¹ it will only represent a small percentage of the maintenance cost in the field. *The important problem before this country will be how to organize its industrial resources so that the supplies required can be produced as rapidly as needed and in the proper proportions.*

With the astounding figures before it, and recalling, perhaps, that the Council proper had deferred action on its request of a month earlier, that "an immediate study be made of what, if any, legislation should be passed

¹Italics are the author's.

designed to empower the Government to deal effectively with any emergency that might arise," the Advisory Commission took a bold stand. On March 24th it said to the Council: "The Advisory Commission feels that it would be delinquent in its duty to the Council of National Defense if it did not at this time bring to the attention of the Council certain matters which we deem of great importance, together with such definite recommendations in connection therewith as represent the views of the Commission." After voicing the public misgivings as to what was being done or not done to prepare for the looming emergency, the Advisory Commission then specifically recommended the immediate raising and equipping of an army of at least one million men and the bringing of the navy to full war strength.

The feeling of the Commission that the Government was not awake to the perils of the crisis was reflected in three concluding paragraphs, which seem to have been an after-thought expressed in extenuation of the plain speaking of the Commission to the Council, whose personnel so largely made up the executive administration of the Government.

The people of the country, as we see it, are very deeply concerned over the possibilities that might develop following the declaration of a state of war in the United States. They are looking to and waiting for the Council of National Defense to direct their efforts, and to take such other steps as may be necessary to provide for the security of the Nation.

We feel very deeply impressed by the responsibility which rests upon us in this grave situation, and we feel that you are entitled not only to know our general views, but to have as well our definite recommendations. We appreciate that we may be misinformed, or more probably uninformed, concerning the real state of the Nation, with reference to the matter of preparedness, and that the fears which we entertain and the recommendations which we have made, may not in fact be justified, and nothing would give us greater personal satisfaction and relief than to have such assurance from you. We feel also that the public, which is very deeply concerned in this matter, and which so far has been willing to leave the question entirely in your hands, should also receive some assurance either that sufficient and definite steps to protect them against possible contingencies have actually been taken or are about to be immediately inaugurated.

We bring this matter before you with the full realization that under the law this Commission is certainly not definitely charged with responsibility in these matters. We do not seek to initiate or direct policies which may have been decided upon and worked out by those who by official appointment are a part of the Administration. We wish rather to lay before you for your information and consideration our innermost thoughts and fears concerning the serious situation which we believe confronts the country, because we would feel condemned by our own conscience and sense of responsibility if we failed to do so.

The writer, who was then secretary of the Council and Advisory Commission, recalls very vividly the tenseness of this joint meeting and the impersonal dignity and precision with which Chairman Willard in behalf of the Advisory Commission presented these views to the Council. It was only one of a number of similar dramatic incidents in which Mr. Willard was the spokesman.

Just how much resulted from this initiative of the Advisory Commission is problematical, but it is true that the supply departments of the army attacked the problem of obtaining the funds that would be required for an army of one million men, after war had been declared, in every-man-for-himself fashion. There was no guiding principle or controlling rule. The Quartermaster figured one way, the Ordnance Bureau another, the Medical Corps still another, and so on. Nobody knew what would be the proportions of the different arms, there was no accepted factor of wastage and replacement. Even the numerical strength of companies, batteries, regiments, and divisions was undetermined. So it was a case of each department head figuring a guess to suit himself. The sum of the guesses totaled \$1,250,000,000; but its components were so unrelated to each other that the War Department finally gave up in despair and asked Congress to vote the sum "in lump," which was the right thing for Congress to do, even if the War Department had had a clear understanding of its needs. True to its retail traditions, which it took more than the first few weeks of the war to overthrow, Congress insisted on a meticulous division and subdivision of appropriations, with no provision whatever for diversion of funds from one bureau to another or even

from one item to another. Weeks passed in haggling with Congress over these matters.

When it was explained to the chairman of the Senate Appropriations Committee that it was absolutely impossible for the War Department to tell how much money it would require, because "nobody on earth can make a reasonable guess of what it would cost to equip a soldier and put him on the battle-fields of France," he exclaimed, "My God! You don't intend to send men over there, do you?" A hazy idea prevailed that the declaration of war was merely a dramatic gesture — after which the United States would get very busy supplying the Allies with war material — at a price.

With such a start the wonder is, not that there were many blunders and agonizing delays, but that things were done as well as they were in the early days. How much the forethought of the Advisory Commission of the Council of National Defense, and the thinking, planning, and acting of its individual members and their reactions on the Government through the Cabinet members who made up the Council, on army officers, on the Congress, and on uncrystallized public opinion, contributed to definition of purposes, clarification of ways, and energetic effort to resolve the tangle into straight lines will doubtless never be appreciated.

By March 31st the Council and the Advisory Commission had got to the point where it was obvious that the requirements of war would necessitate a comprehensive programme of control and coördination of buying and manufacturing. A resolution was adopted by the Council on that day, following the recommendation of the Commission, providing that the Secretary of War, as chairman of the Council of National Defense,

shall appoint a Purchasing Board, Council of National Defense, to be composed of Army and Navy Department heads or officers appointed by them and representatives appointed by the Advisory Commission, the purpose being to coördinate the buying of the several departments; assist in the acquirement of raw materials and manufacturing facilities; the establishing of precedence of orders, etc., including the ordinary commercial and industrial needs and the military requirements of the Nation. Such committees shall

have no authority at this time to issue purchase orders, make contracts, or bind the Government in its purchases; all these things to be done, as at present, by the respective departments. The chairman of the Committee, however, shall have authority to require, when necessary, that certain (conflicting) purchases be not made until the same, with a full statement of the facts, have been submitted to the Secretary of War or Navy.

It was further set forth that the chairman of the Purchasing Committee should be designated by the chairman of the Advisory Commission; that the army should be represented by the chiefs of Ordnance, Quartermaster Department, Engineer Corps, Signal Corps, Medical Corps, and General Staff; that the navy should be represented by the chiefs of Ordnance, Construction and Repairs, Medicine and Supplies, Marine Corps, Supplies and Accounts, Steam and Engineering, Yards and Docks. It was further provided that the Advisory Commission should be represented on the proposed committee by appointees of Messrs. Baruch, Coffin, Rosenwald, and Martin.

Mr. F. A. Scott, a well-known manufacturer of Cleveland, was subsequently appointed chairman of this committee, whose name was changed to that of the General Munitions Board. Messrs. Coffin, Rosenwald, and Martin were the representatives of the Advisory Commission, Mr. Summers representing Mr. Baruch and the Raw Materials Committee. The General Munitions Board had been preceded by a Munitions Standards Board which virtually died with the birth of the General Munitions Board.

The new board proceeded to appoint a number of sub-committees on army vehicles, armored cars, emergency construction contracts, optical glass, storage facilities, machine guns, priority, and accountancy.

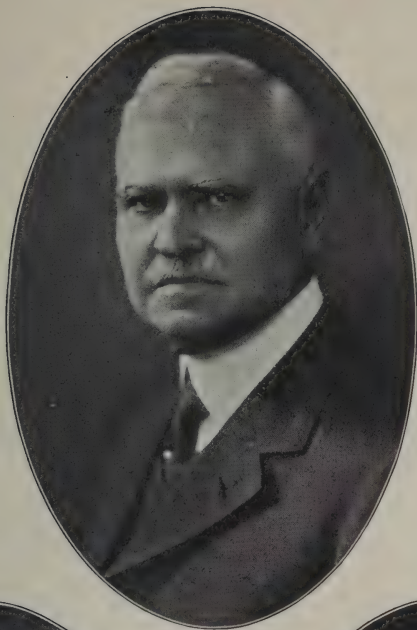
The General Munitions Board endeavored to direct its efforts toward the coördinating of purchases by the army and navy and assisting in the acquisition of raw materials in establishing the precedence of orders between the army and navy and between the industrial needs of the country. The Board's authority and scope of action were on the whole but vaguely defined. It necessarily dealt with raw materials, and yet there was a Raw Materials Committee of the

Advisory Commission. Similarly it had to do with requirements of such supplies as cotton, woolen goods, and shoes and of the numerous articles required by the armed forces of the country, yet the Advisory Commission had, under a general Committee on Supplies, of which Commissioner Rosenwald was president, a host of coöperative committees on cotton goods, woolen manufactures, shoe and leather industries, knit goods, and canned goods. At this time, too, Commissioner Baruch had established sub-committees on alcohol, aluminum, asbestos, magnesium and roofing, brass, cement, chemicals (nine sub-committees), copper, lead, lumber, mica, nickel, steel and steel products (eleven sub-committees), oil, rubber, wool, and zinc.

The General Munitions Board was not a month old before the members of the Advisory Commission began to see that it did not meet the demands of the hour. Instead of progressing toward centralization, the Commission found that too many committees were being appointed. The Commission found itself constantly involved in talking about and recommending things that it felt some energetic, resourceful executive body should be doing. On June 13th, Director Gifford suggested to the Council a draft of a plan for reorganizing the committees, the Council having, on June 8th, called a halt on the multiplication of committees. On July 9th, Chairman Willard, of the Advisory Commission, urged on the Council that something be done to develop new and substitute sources of supply, such as toluol, oil, and nitrates, to follow up orders after placing, to distribute raw and manufactured materials in accordance with the relative urgency of demand, to improve the use of shipping, to deal with the question of prices on certain raw materials and finished products, and (the next day) to provide for "*central authority and decisive information.*"

Finally after six weeks of consideration, the Council voted on July 8th to establish the War Industries Board.

In place of the twenty-two members of the General Munitions Board, the War Industries Board was made up of Frank A. Scott, chairman; Bernard M. Baruch, Commissioner of Raw Materials; Robert S. Brookings, Commissioner of Finished Products; Robert S. Lovett, Priority



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MAJOR-GEN. GEORGE W. GOETHALS

Member of the War Industries Board representing the Army

REAR-ADMIRAL FRANK F. FLETCHER

Member of the War Industries Board representing the Navy

BRIG.-GEN. PALMER E. PIERCE

Representing the Army in the early organization of the War Industries Board

Commissioner; Hugh A. Frayne, Labor Commissioner; Colonel Palmer E. Pierce, representing the army; and Rear Admiral F. F. Fletcher, representing the navy.

The duties of the new board were officially defined as follows:

The Board will act as a clearing-house for the war-industry needs of the Government, determine the most effective ways of meeting them, and the best means and methods of increasing production, including the creation or extension of industries demanded by the emergency, the sequence and relative urgency of the needs of the different Government services, and consider price factors and, in the first instance, the industrial and labor aspects of problems involved and the general questions affecting the purchase of commodities.

On this Board Mr. Baruch will give his attention particularly to raw materials, Mr. Brookings to finished products, and Mr. Lovett to matters of priority. These three members, in association with Mr. Hoover so far as foodstuffs are involved, will constitute a commission to arrange purchases in accordance with the general policies formulated and approved.

The Council of National Defense and the Advisory Commission will continue unchanged and will discharge the duties imposed upon them by law. The committees heretofore created immediately subordinate to the Council of National Defense, namely, Labor, Transportation and Communication, Shipping, Medicine and Surgery, Women's Defense Work, Coöperation with State Councils, Research and Inventions, Engineering and Education, Commercial Economy, Administration and Statistics, and Inland Transportation, will continue their activities under the direction and control of the Council. Those whose work is related to the duties of the War Industries Board will coöperate with it. The sub-committees advising on particular industries and materials, both raw and finished, heretofore created, will also continue in existence and be available to furnish assistance to the War Industries Board.

The purpose of this action is to expedite the work of the Government, to furnish needed assistance to the departments engaged in making war purchases, to devolve clearly and definitely the important tasks indicated upon direct representatives of the Government not interested in commercial and industrial activities with which they will be called upon to deal, and to make clear that there is a total disassociation of the industrial committees from the actual arrangement of purchases on behalf of the Government. It will

lodge responsibility for effective action as definitely as possible under existing law. It does not minimize or dispense with the splendid service which representatives of industry and labor have so unselfishly placed at the disposal of the Government.

The Council, then, through the attrition of events was proceeding to educe action from advice.

NOTE

The writer, who happens to be a Republican, wishes to make the following statement with regard to Secretary of War Baker and his five Democratic Cabinet associates forming the Council of National Defense:

Looking back on the three years in which he served the Council, he is unable to recall a single instance in which Mr. Baker or the Council requested him to make an appointment or take an administrative action on a personal or political basis. He believes this to be the experience as well of Mr. Gifford, who was Director of the Council during the critical early period, when the writer was its secretary. The writer always felt as free as air with Mr. Baker on this score, after the armistice as well as before.

During the crowded vital days in which the Council's Advisory Commission, a majority of which was composed of Republicans, was almost daily nominating to the Council boards or committees of industrial and scientific experts — was, in short, creating the dollar-a-year men, the greater portion of whom were Republicans — there was not an instance, so far as the writer's memory serves, of an appointment being swayed by the political equation. The question was not raised at all. It was a clean business throughout in this respect, and a demonstration of non-partisanship in a crisis that the writer would not have believed possible before going to Washington. And it is something that in common decency needs saying — particularly when there is taken into account the tremendous unexpected task that was thrust upon the Council, composed of six work-driven heads of as many great Executive departments, in the early months of our participation in the war.

To Secretary of War Baker undoubtedly should go the credit for making possible this state of affairs, which did honor to the Government and the country alike. The credit is no less due Mr. Baker by reason of the fact that his attitude reflected the policy of

the President with respect to enlisting the best industrial and scientific brains of the country regardless of party affiliation.

Republicans comprised easily seven eighths of the personnel of the working executives of both the Council of National Defense and the War Industries Board and their subordinate bodies. The writer's immediate office staff and that of his predecessor was made up exclusively of Republicans, not because any one ever inquired as to the politics of an appointee, but because it happened to be so.

So far as the writer's knowledge is concerned, and he was reasonably in a position to know, politics simply did not enter into the make-up of the American industrial war machine.

Impartial analysis of the personnel structure of other vital emergency war bodies will tend to further interesting reflection in this field. All of which is something for those to ponder who attacked Mr. Wilson's administration for not establishing a coalition war government.¹

¹See page 189.

CHAPTER III

THE WAR INDUSTRIES BOARD EMERGES

The objective in sight—Synchronizing the civilian dollar-a-year man with the military—The machine lags—The bitter price of unpreparedness—The President acts—Enter Baruch—Review of the drifting period—Baker and Baruch—The new dispensation—Industry now stripped for war.

THE creation of the War Industries Board marked a great step forward. Coördination, the long-sought, was not yet overtaken, but it was in sight. It was now perceived that civilians must assume control of the general direction of industry. It was no longer a matter of advising about immediate munitions and helping the army and navy in buying. It was now a matter of deciding on the manipulation of the whole of the resources of the Nation. The objective had definitely emerged.

The new board replaced the General Munitions Board and the Munitions Standards Board, whose very designations, as contrasted with that of the new board, showed how completely new a dispensation it was to be. It logically took over the numerous raw material and supply committees, heretofore in separate compartments under Commissioners Baruch and Rosenwald, respectively, which were really the larger of the affluent sources united in the new board.

The concept of the functions of a civilian agency coöperating with the army and navy for the control and direction of industry to war needs and purposes was now well defined and the agency for bringing it about somewhat compacted. Most of the functions of the Advisory Commission that related to materials and goods had been brought together under one head, but there was lacking a sufficient degree of either legislative or executive authority, and the organization was anomalous in that the chairman was not a member of the Advisory Commission and yet had such members serving under him.

The stage of intelligent understanding had been reached, but the technique of executive direction remained to be

perfected and the Board was not accorded, in the view of the army and navy and other war instrumentalities, so high an estimate of its own importance as it rightly held of itself. Theoretically, coördination of requirements and purchases had been effected. Often, even generally, this was true, but the supply departments of the army and navy largely looked upon the War Industries Board as a sometimes helpful but usually meddlesome agency. They valued it highly as a source of information, esteemed its advice when they sought it; but felt no imperative necessity of yielding to it as the central clearing-house of the business activities of war.

It took time for professional military men, even for the amateurs but lately commissioned, to concede that even in modern war there is a province for the man from civil life in which he must be superior to the man in uniform. The age-old tradition of war as a water-tight compartment in national life, instead of being that life itself, was hard to shake off. The time for fighting had come — the moment for which officers had spent years of preparation. War had the stage, and the fighting man, after years of obscurity and humility, had the spotlight and wanted to run the whole machine. Volunteer helpers in civilian clothes at dollar-a-year pay were apt to appear as interlopers desirous of holding the stage in war as well as in peace.

If the subsequent practice had been equal to the spirit of the first meeting, the War Industries Board would have got into full function eight months before it did. Secretary Baker was there and stated that he and the Secretary of the Navy would accept all recommendations made by the Board. He also declared that, if necessary to support the War Industries Board in respect of its decisions regarding the requirements of the Allies, he would use the commandeering power to seize and pay for goods and would then sell them to the Allies at cost. Yet the army went on independently with the huge Du Pont contract, the immense storage and embarkation base at South Brooklyn, and scores of other projects that were bound to react disturbingly on the whole industrial balance. Its officers often ignored or were contemptuous of the Board, reckless commandeering flourished, and the navy in placid serenity pursued its own

way. This is set down, not in censure, but in emphasis of the fact that, though there was much crying of coöperation, there was a dearth of practice. Perhaps in despair of the Board's lack of vigor, Mr. Baker found his promise invalid, surrendered to the steam roller of the army's eager will to dominate, and thus came to seek a way out in that plan of military replacement of the War Industries Board by an organization within the army with which Mr. E. R. Stettinius was connected.

Under such circumstances no amount of organization of the committee and board projections, under whatever impressive names — such as War Industries Board and Aircraft Production Board — proceeding from a body organically labeled as purely advisory, could begin to effect in attainment the perfection of its paper scheme. The only ways out of this situation were those of legislation, evolution, or devolution. Chairman Scott broke down under the multitude of cares and strains of the infinitely detailed work resulting partly from a lack of unassailable authority on which a smoothly functioning executive could be built up.

At this time the Council and all its brood were under something of a cloud of public obloquy and eclipse of prestige resulting from the basically sound but hysterically overemphasized criticism of the fusion (eliminated when the War Industries Board was formed) of active business with membership of committees having to do with advice relating to purchases. The dual relation, the result of a hasty short cut, was undoubtedly wrong in principle, but it is a tribute to human nature at its best that there was in fact so little, if any, abuse of it.¹

The American press is as mercurial and as given to emotional outburst as are the people themselves. It arrives at its final judgments only after voicing the most conflicting opinions, but the "revelations" of the period, and the skepticism of the public as to the integrity of any man placed in a position of buyer and seller in one, resulted in a great reaction of opinion concerning the Council and its subsidiary bodies. It had been the spoiled child of popular favor, and

¹The Raw Materials Division avoided this rock. The chairman and his assistants were always representing the Government, and the committees the industries.

it now was sent into Coventry. Its moral authority on its industrial side, as opposed to its work as the unifier of the national thought and will to victory, was impaired. The general public feeling at this time was that the American war effort was fumbling both militarily and industrially. There was much talk of a coalition government, and the idea of a Munitions Department was in high favor. Thus there came a period of doldrums. The men in the Council's organization worked no less hard than before and made much progress in efficiency, but the impetus to rapid evolution was distinctly checked.

Daniel Willard, president of the Baltimore & Ohio Railway, a noted and forceful executive and chairman of the Advisory Commission, succeeded Mr. Scott in the midst of this period of uncertainty and eventually resigned because he felt that he could do more as an active and powerful railway president than he could as head of an organization that had such great authority to advise and so little to act. Individual functions of the Board continued to perform services of the highest value, but there was lacking coördination within what was supposed to be the great coördinator. In plain truth the War Industries Board was not meeting the demands of the hour. Its members knew what should be its function, but the power of authority and action was lacking.

So, it must be conceded that in the latter part of 1917 and first part of 1918, the evolution of the basic war control halted and stumbled. There was even a period, following Mr. Willard's resignation, when there was no chairman. It was at this time that the so-called War Council was created by the Council of National Defense. It was a weekly conference of the Council, the director thereof, the Secretary of the Treasury, the chairman of the Shipping Board, the Food Administrator, the Fuel Administrator, and the chairman of the War Industries Board. Some progress resulted from these conferences, but the tendency of the time was too much toward the seeking of coördination through vocal conferences. What was needed was an autocrat over all supply matters.

The conferences were almost always harmonious and full

of assurances of coördination. The executive spirit was willing, but somehow the effecting flesh did not respond. There was need of a powerful personality who would assume power and responsibility, who would decide and stand by his decisions and wrench his power from necessity. It may be that it required time and disappointing experience to bring the War Industries Board to the climax of its potentialities, but, in view of the simplicity of the organization that finally accomplished the end, and the fact that it never had more statutory power at the last than at the first, it is the matured judgment of the writer, who lived at close quarters with the events of this period, as well as with those of the preceding and successive phases, that the evolutionary process could have been compressed greatly.

The fact is that in the formative months of the Board, the true principle of executive success was not applied — the principle of centralization of responsibility and decentralization of authority. Mr. Scott's tendency was to centralize both, and Mr. Willard was disgusted with the lack of specific authority. All along the line everybody was either waiting, or needed, to be told what to do by some one who could make it "stick." We are forced to the conclusion, then, that development of the War Industries Board halted for lack of the right man at the head.¹

This involves no depreciation of Mr. Scott or Mr. Willard as executives. The situation not only demanded a great executive, but, more, it required one whose environment in life was such that he would be under no compulsion of men, traditions, contacts, or things. It called for a man whose environment had made him so independent that he could, in the words of the late Paul Morton, "look any man in the eye and tell him to go to hell," if need be. Such a man could have done in the middle of 1917 what was done in the spring of 1918. On the other hand, it must be remembered that each passing month of failure to arrive at the much-talked-

¹It is known that the President himself, throughout this terrible drifting period that depressed all of us, was seeking for what he called a "superman" to head the War Industries Board. The position was offered to Homer Ferguson, then president of the Newport News Shipbuilding Company, and later head of the Chamber of Commerce of the United States; and to John D. Ryan, later in charge of aircraft production. Both declined, doubtless because of the inhibitions surrounding the post.

of coördination in a sense made the job easier for the right man. The functions of the Board were developing all the while, and there was much that was possible of accomplishment in the then mood of industry and the war agencies that did not need to be backed by a central will.

The functional instrumentalities of the Board developed rapidly after the formation of the War Industries Board in August, 1917. The principle of priorities was well established, as also its administration. Conservation was in full swing. Clearance, on paper at least, was working smoothly. The vital Inter-Allied Purchasing Commission had been firmly established. Price-fixing was making a good start. The appraisalment of resources was steadily going on and headway was being made in the massing and systematization of requirements. The labor division was functioning effectively. The commodity sections were busily at work, as far as they had been created. While the machine as a whole was not yet filling the void in the great structure of industrial unification in support of the army and navy and the maintenance of the national industrial fabric, it was already taking much the final form in which it was later welded so successfully. Time was lost in the gradual growth, but at the same time each functional activity, as a result of the gradual process, met with little opposition when proposed. The machine was one that was developed rather than projected. It was the child of experience and of obvious necessity, and not the product of theory. Each part worked when introduced because it was manifestly needed.

By this time there was a well-crystallized conception of the objectives of the War Industries Board's work. However defective the attainment of them remained until the spring of 1918, they continued to be the established goals. Briefly stated, the functions of the Board were (1) to allocate commodities of which there was or was likely to be a deficit, to encourage their increased production and effect their orderly flow "into channels most conducive to the purposes of the war," which necessitated "priority" and price-fixing; (2) to analyze, bring together, measure, alter, and restrain the demands of the Government, of the Allies and of the public; (3) to ascertain to what extent and in

what manner the supplies could meet the requirements; and to take the action thereby indicated.

The essential nature of the War Industries Board was lucidly stated in an address¹ by Mr. Baruch before the War College in Washington, when he said:

The War Industries Board was a method of control devised by the President to equalize the strain placed upon the American industrial structure by the war. It endeavored to stimulate and expand production of those materials essential to the war programme, and at the same time to depress and curtail production of those things not of a necessitous nature. This was done by regulation in consonance with other executive branches of the basic economic elements: (a) facilities, (b) materials, (c) fuel, (d) transportation, (e) labor, (f) capital. The method of control was through a preference list upon which were placed those industries whose output was essential to the war's progress. The priority indicated by the preference list was the master key to the six elements named.

It should be said that, although it was the exchange of the Government agencies involved in the prosecution of the war — the universal meeting-place of requirements, resources and facilities, maker of prices, moulder of contracts, accelerator and brake of industry — it was not a purchasing agency in the strict sense. Except for its own expenses it never spent a cent of Government money. It made agreements with the trades, but it did not sign contracts. Actual purchases, contracts, and all the details of business transactions were attended to by the proper agencies within the departments that were statutorily charged with purchasing functions. In a broad sense it was certainly a comptroller of purchases, but it did not make them. This lack of actual purchasing power was sometimes a very serious handicap, but it was offset by a detachment from an infinitude of details and personal contacts that made for added power in dealing with the fundamentals of Government relations to industry.

The functional divisions of the Board's work and the solid base of the commodity sections on and through which the functions were largely exercised will be considered as to

¹March 12, 1921.

both origin and composition and nature at a later time. In recording the achievements of the War Industries Board, however, no special effort will be made to distinguish between the war industrial measures taken directly under the Council of National Defense, under the General Munitions Board, under the first phase of the War Industries Board, or under its second and final phase. From the beginnings of the Council the functions of the War Industries Board were exercised. In essence the Board or what it stood for was born with the Council.

As the long-heralded German drive of the spring of 1918 came nearer, it was more and more borne in on the men in the Council and in the War Industries Board, and among all who were in touch with the progress of the war effort, that America must speed up and tighten up its war machine. It was evident that the country was not yet in effective fighting trim — that its vast strength was not yet being applied; that it was still entangled in the coils of disordered efforts; that the army, engaged in the stupendous task of organizing the personnel of the actual fighting forces, which time and again were expanded beyond the early estimates, was not able to rise above its immediate absorptions far enough to gain a comprehensive view of the industrial incidence and indispensable corollaries of its own plans and necessities. This, of course, was the inevitable result of the blind policy of unpreparedness which has dominated the Nation from time immemorial.

Considering the circumstances, it is amazing that the army so smoothly and so vastly expanded from a handful of men to trained millions in arms. To meet the concomitant industrial expansion and conversion it was indispensable that men who understood commerce and production as the military chiefs understood their peculiar field must find a way to dominate the army in relation to those bases of army strength which were to be found primarily in civilian management. It was evident that no mere advisory body could withstand the initiative of the compact authoritative army organization, burning with zeal and sparkling with energy in its rush to perfect and expand itself, without due regard to an impairment of the sources of ultimate supply and power that was

certain to follow. The army did not adequately comprehend the greater strategy of modern war, the industrial strategy, with its colossal scale, which involves the maneuvering and directing of all the forces and resources of the Nation; which is a matter of factories and mines and labor, of coal and wheat and steel, of transportation and civil morale as much as of regiments, divisions, corps, and armies.

The time had come when there must be created a power that would be able to harness the purely military organization and the war industrial forces into an harmonious team. Either the War Industries Board must rise to this eminence or there must be an entire reconstruction of the central control. The former course was decided upon by the President, probably because it was merely a step forward with an existing mechanism which could be taken without upset of what was being done well and without resort to Congress for new legislation. It required only an Executive order that would impart to the War Industries Board such share of the well-nigh universal war powers of the President as commander-in-chief of the army and navy, as would make it supreme in the contacts of military and industrial departments of the armed Nation.

So, it came about that on March 4, 1918, the President issued the Executive order which endowed the War Industries Board with authority proceeding directly from the supreme source of the executive power. The war was henceforth to be conducted, not only by the army and the navy, but by them with the War Industries Board, and in its field the last was to be supreme. While the Board was thus brought into a position of unquestionable potency in relation to the army and navy, it would have required legislation to strengthen its original power over industry. It had, however, such a grip on industry by reason of its now more intimate cohesion with the Executive and military establishments and its freedom of resort to the powers invested in them by reason of various acts, which will be reviewed later, as well as with the transcendent war powers of the President, that legislation was neither necessary nor advisable.

The President's letter of March 4, 1918, did not work any fundamental change in the evolved structure of the War

Industries Board.¹ It simply appointed a new chairman of the Board and gave him the prestige and substance of direct Presidential authority that made him independent of the military arms. The machinery remained much the same, but it was henceforth dominated by civilians, was now suffused with power, and was happily placed in the control of a man peculiarly fitted for the task, Bernard M. Baruch. It should not be overlooked that the Executive order did remarkably tend to unify and coördinate the Board itself. With the exception of the price-fixing function, the whole authority of the Board was centralized in the new chairman, which gave him an advantage that neither of his predecessors

¹The text of the letter is as follows:

THE WHITE HOUSE
WASHINGTON, *March 4, 1918*

MY DEAR MR. BARUCH: I am writing to ask if you will not accept appointment as Chairman of the War Industries Board, and I am going to take the liberty at the same time of outlining the functions, the constitution and action of the Board as I think they should now be established.

The functions of the Board should be:

- (1) The creation of new facilities and the disclosing, if necessary, the opening up of new or additional sources of supply;
- (2) The conversion of existing facilities, where necessary, to new uses;
- (3) The studious conservation of resources and facilities by scientific, commercial, and industrial economies;
- (4) Advice to the several purchasing agencies of the Government with regard to the prices to be paid;
- (5) The determination, wherever necessary, of priorities of production and of delivery and of the proportions of any given article to be made immediately accessible to the several purchasing agencies when the supply of that article is insufficient, either temporarily or permanently;
- (6) The making of purchases for the Allies.

The Board should be constituted as at present and should retain, so far as necessary and so far as consistent with the character and purposes of the reorganization, its present advisory agencies; but the ultimate decision of all questions, except the determination of prices, should rest always with the Chairman, the other members acting in a coöperative and advisory capacity. The further organization of advice I will indicate below.

In the determination of priorities of production, when it is not possible to have the full supply of any article that is needed produced at once, the Chairman should be assisted, and, so far as practicable, guided, by the present priorities organization or its equivalent.

In the determination of priorities of delivery, when they must be determined, he should be assisted, when necessary, in addition to the present advisory priorities organization, by the advice and coöperation of a committee constituted for the purpose and consisting of official representatives of the Food Administration, the Fuel Administration, the Railway Administration, the Shipping Board, and the War Trade Board, in order that, when a priority of delivery has been determined, there may be common, consistent, and concerted action to carry it into effect.

In the determination of prices the Chairman should be governed by the advice of a committee consisting, besides himself, of the members of the Board

had. The Board as a whole and its subsidiary bodies remained, *but the sole right of decision was placed in the hands of the chairman.* Authority and responsibility were centered in one man, to do with them as he pleased. He wisely chose to delegate the authority and retain the responsibility. To each of his boards he transmitted all of the power in that particular direction that the President had conveyed to him and at the same time he undertook to shoulder all responsibility.

The exception of price-fixing from direct control by the chairman of the Board, while a seeming violation of the long-awaited application of the principle of the centralization of power and responsibility, was really a lubricant for

immediately charged with the study of raw materials and of manufactured products, of the labor member of the board, of the Chairman of the Federal Trade Commission, the Chairman of the Tariff Commission, and the Fuel Administrator.

The Chairman should be constantly and systematically informed of all contracts, purchases, and deliveries, in order that he may have always before him a schematized analysis of the progress of business in the several supply divisions of the Government in all departments.

The duties of the Chairman are:

- (1) To act for the joint and several benefit of all the supply departments of the Government.
- (2) To let alone what is being successfully done and interfere as little as possible with the present normal processes of purchase and delivery in the several departments.
- (3) To guide and assist wherever the need for guidance or assistance may be revealed; for example, in the allocation of contracts, in obtaining access to materials in any way preëmpted, or in the disclosure of sources of supply.
- (4) To determine what is to be done when there is any competitive or other conflict of interest between departments in the matter of supplies; for example, when there is not a sufficient immediate supply for all and there must be a decision as to priority of need or delivery, or when there is competition for the same source of manufacture or supply, or when contracts have not been placed in such a way as to get advantage of the full productive capacity of the country.
- (5) To see that contracts and deliveries are followed up where such assistance as is indicated under (3) and (4) above has proved to be necessary.
- (6) To anticipate the prospective needs of the several supply departments of the Government and their feasible adjustment to the industry of the country as far in advance as possible, in order that as definite an outlook and opportunity for planning as possible may be afforded the business men of the country.

In brief, he should act as the general eye of all supply departments in the field of industry.

Cordially and sincerely yours

WOODROW WILSON

MR. BERNARD M. BARUCH,
WASHINGTON, D.C.

the whole organism. Price-fixing was a ticklish business and might easily cause more misapprehension and arouse more public censure of the Board than anything else it could do. If prices were thought too liberal by the general public, the Board — if it had had the ultimate responsibility for fixing them — would have been accused of being the tool of the “interests,” which was a calumny that was always lurking in the background and frequently voiced. If considered too close by the manufacturing public, the opposite charge of persecution of business would have been hurled at it. By having the prices suggested by a committee that was in the Board, but was appointed directly by the President, who passed personally on its decisions, the responsibility was placed on a too lofty eminence for successful assault by scandalmongers or profiteers.

The War Industries Board was now an entity, clothed with ample authority and commanded by a seasoned captain, who had had fifteen months of arduous experience in the difficult art of making “requests” as effective as orders. He had been through the mill. He had helped build the machine in every part from the earliest days and the general plan had been originated by him. He now proceeded to perfect and extend the machine, change and add to personnel to make it conform to the organic conception of expert civilian intermediation between the war-making and war supply.

It would be pleasing to say that the evolutionary process, though tedious, was a steadily progressive one, but the dismal truth is that it was intermittent, with a long period that came near to devolution and dissolution. The defect of the War Industries Board, as at first created, was that it was a committee. Committees are good for counsel, but poor for action, and especially so when their authority is nebulous, and for lack of leadership they do not stretch it and strengthen it by use. So, all through the fall of 1917 and winter of 1918 we find the War Industries Board talking much and postponing or refusing decision.

“There is a tendency to too much looseness and getting tired once in a while,” says an entry in Mr. Baruch’s diary in November. “The more committees, the more lack of

coördination," reads another entry. "No one wants to give the power to one man. This makes them less powerful, and they think it makes him too powerful. Fiddle while Rome burns. It will go, but time is the essence."

Referring to another delay in passing on a powder plant project, the skeletonized diary asks, "Will this be a case of too late, as in another instance, of one man authority and responsibility needed?"

"All these men get everybody's advice, and then take the wrong advice," runs another comment on the committee system. "I would rather do the wrong thing than wait till the right thing becomes the wrong thing and the wrong action would have been the right one." And again: "What is everybody's job is nobody's job."

"The confusion is greater and not less here," says an entry on January 19th. "No one has a plan and all seem too tired to do anything except to criticize."

At this time it appears that the Secretary of War was considering some sort of a law to centralize the administration of munitions. Referring to this fact, the diary says: "In the meantime, the greatest disorganization is going out and grabbing right and left for men to strengthen themselves, with no thought of the thing as a whole." Coördination was still an iridescent dream. For lack of a powerful centralized control, every department was seeking to do its best in its own way; making itself internally efficient, while rendering the improvement nugatory by destroying team-work.

Of many records that might be cited to show how many twilight zones of overlapping authority there were, it will suffice to take one relating to imported raw materials. A letter from Baruch to Dr. Edwin F. Gay, then associated with the Shipping Board as head of the Bureau of Planning and Statistics, written on February 23, 1918, sets forth that after nearly a year imported raw materials were definitely under the control of no one agency. The Shipping Board, the War Trade Board, and the War Industries Board were all interested in this subject, and whatever the last-named did in its efforts to make the best use of all available supplies was subject to review and revision by the others.

Either you must have confidence in the War Industries Board's findings or the War Industries Board must have confidence in your findings. If each department of the Government has an agency to review the findings of the other, interminable delays will follow, responsibility will rest nowhere, and the work cannot and will not be done. Therefore, as I have said to you on many occasions before, you can depend upon my hearty and active coöperation, but I beg of you not to pass by the suggestions I make to you. There is too much duplication already, business is being harrowed by their increasing questionnaires and the multiplying of committees. *There is no one organization to which business can look for aid and instruction.*

On paper, the War Industries Board was the clearing-house of materials, but, evidently, it was not functioning. At this time the Board was even without a chairman. On February 2d, Baruch's diary records a solemn warning to the Board of the necessity of clearing raw materials through one channel. Both the diary and correspondence between members of the Board and heads of departments and war agencies show that all through this period the War Industries Board was far from accomplishing its purpose. In spite of the fact that the word "coördination" was worn threadbare from much use, there was no central power driving to that end. It would be inaccurate to give the impression that there was not a great amount of correlation and coöperation, but it was clumsily effected, irregular and uncertain. There is authoritative documentary evidence that as late as February, 1918, the various bureaus of the War Department had not succeeded even in coördinating themselves in the matter of purchase to effect which the Advisory Commission of the Council of National Defense, the General Munitions Board, and the War Industries Board had successively addressed themselves.

It was not only to effect this internal harmonization, but probably to become independent of the War Industries Board, that E. R. Stettinius, a partner in the banking firm of J. P. Morgan & Co., was brought into the War Department at the end of January, 1918, as Surveyor-General of Supply. He did not accomplish much in the way of eliminating the War Industries Board because the men he needed were with

Baruch and because the Secretary of War recognized that he must work with the War Industries Board. Back of Stettinius's appointment there seems to have been an idea that, as the War Industries Board was dwindling instead of growing, it was incumbent upon the War Department to rely upon itself, and to take up anew the burdens of which it had not been effectively relieved.

The thought the Secretary of War was giving to the subject of reorganizing the industrial relations of the Government and Baruch's growing disgust with the way things were drifting in the headless War Industries Board brought them into conference on February 1, 1918, though it must be remembered that Baruch was then only one among the members of the Board. While it seems to be pretty well established that Baruch and Secretary Baker were not closely attuned, and the latter was opposed to the former's appointment as chairman of the War Industries Board, the Secretary was favorably impressed by Baruch's draft of a scheme for a creation of a Director of War Industries and Raw Materials.

Incidentally, it is interesting to note that a month or so before this conference of February 1st, the Secretary of War, in discussing with Baruch the filling of the vacant chairmanship of the Board, informed him that, while he (Baruch) had done the best work of any of the civilian executives called into service by the emergency, he (the Secretary) did not consider that Baruch was fitted for the place of executive in a large organization. It was the Secretary's idea to appoint to the headship of the new organization a great industrialist not then connected with the Board. Baruch was to be a sort of under-secretary to the new man and the real power behind the throne.

This was the supreme test of the quality of patience and the policy of submergence of self that had stood Baruch in such good stead in all the months in which, despite untold discouragements and humiliating rebuffs, he had steadily driven ahead with the work in hand, doing each task as it arose or as he created it. Had the President requested it, it is likely that Baruch would have stood even this test. Just what finally directed the President's choice to Baruch is not known, but it is suspected that Secretary McAdoo had some-

thing to do with the matter, for it is known that he informed Baruch that if his position in the War Industries Board became intolerable he "could come over and run the railways." It must not be forgotten that at this time Baruch, as a member of the War Industries Board, which was still a part of the Council of National Defense organization, was really subordinate to Secretary Baker, who was chairman and dominant member of the Council, and that the Secretary was entirely within his rights in taking it upon himself to name or recommend the new chairman of the Board.

A brief draft of the proposed reorganization submitted by Baruch to Baker afforded a basis for the conference between them. The following is a copy of it:

DIRECTOR OF WAR INDUSTRIES AND RAW MATERIALS

This should be a legal, authoritative, responsible, centralized agency for the purpose of coördinating the demands of the fighting forces. The object should be to mobilize the resources of the country, to create new facilities and additional sources of supply, not alone for the military and naval requirements, but civilian needs with as little dislocation of industry as possible. This agency should have the power, subject to the approval of the President, to commandeer plants, products, equipment, manufacturing facilities, mines and materials, and the additional power not now granted of reselling and distributing materials thus commandeered.

He should be appointed by the President. In no way is he to have anything to do with naval or military matters, but only furnishes requirements for the military and naval forces. He should decentralize his authority by appointing, subject to the approval of the President (if he so desires), heads of various departments subdivided substantially as outlined below; new departments or subdivisions to be added from time to time, as found necessary. These departments are not arranged in the order of their relative importance.

Explosives.

Guns, Shells and Components? (Doubtful, for discussion.)

Supplies.

Conversion of Industries.

Creation of New Facilities.

Priority Division.

Various Raw Material Divisions, as Steel, Non-Ferrous Metals, Chemicals, Lumber, Miscellaneous, etc.

Statistics.

Power Controller.

Board of Compensation and Price-Fixing (five, one of whom shall be a labor man).

This last-named board, in coöperation with the Federal Trade Commission, shall, subject to approval of the President, fix the prices of all materials. It will act in all large or important contracts in case of disagreement. This eliminates delays.

All requirements to be submitted to his chiefs for allocation and determination. Good judgment will dictate as to what he should direct and what he should not. Contracts to be signed by the departments, as now, which shall also determine the technical questions, inspection, follow-up, and receiving. Under the reorganized system the Director of Supplies for the Army, the Paymaster-General for the Navy, the Purchasing Agent or other designated officer of the Shipping Board, the Purchasing Agent of the Aircraft Production Board, and the Allied Purchasing Commission submit requirements through the Director to the subdivisions.

If necessary to create new facilities or sources of supply, the technical men of the departments involved must necessarily be used.

On February 1st, Secretary Baker sent to the President a letter setting forth the joint conceptions of himself and Baruch regarding a reorganization of the War Industries Board, which deserves quotation in full, as follows:

MY DEAR MR. PRESIDENT:

Mr. Baruch and I have discussed at length the suggestion of a reorganization of the War Industries Board. Mr. Baruch believes that the body should be a legal, authoritative, responsible, centralized agency for the purpose of coördinating the demands of the fighting forces. Its object should be to mobilize the resources of the country, to reveal new facilities and additional sources of supply, not alone for the military and naval requirements; but also to the end that the civilian needs be supplied with as little dislocation of industry as possible; that this agency should have power, subject to the approval of the President, to commandeer plants, products, equipment, manufacturing facilities, mines and materials, and the additional power not now granted of distributing materials thus commandeered.

In this general statement I concur. Mr. Baruch believes with me that it takes in, in general terms, the whole programme, and that, in all likelihood, some of the features cannot be immediately

accomplished; but that ultimately this agency whatever its form will have to exercise substantially these functions.

We agree that the following functions are to be performed:

1. Procurement of military supplies.
2. Conservation of general industrial condition of the country.
3. The determination of prices and compensation.

In order to carry out these purposes, it seems to us that the present plan of organization of the War Industries Board is ill-adapted, for the reason, first, that its numbers lead to debate and delayed decision, and, second, because its power is at present consultative and not final, except by consent.

We recognize that the present question is the appointment of a successor to Mr. Willard, and that the redistribution of power will have to be delayed until the President is empowered by legislation; but the immediate reorganization could begin and suitable distributions of power could then be made when the legislation is secured.

Our suggestions, therefore, would be that a chairman of the War Industries Board be appointed; that he be directed immediately to reorganize the institution so as to bring about a comprehensive survey by him of the war needs of the Government, with power in the Chairman to allocate supplies of material and manufacturing facilities, and to determine conversions of industry, both for apportionment to the several war needs reported to him by the purchasing departments of the Government, and also with a view to the adjustment of the industrial needs of the Government to the general industrial situation of the country, so as to prevent undue dislocation; and to have in view constantly the distribution of labor, transportation facilities of the country, and the general maintenance of industrial standards and facilities, both during and after the war.

Second, the creation of a committee to work in coöperation with the Federal Trade Commission, and to report directly to the President, for the semi-judicial determination of questions of compensation and price. The questions to be considered by this body to be referred to it by the chairman of the War Industries Board, and its general administrative procedure subject to his general direction.

Such an organization as is herein suggested would, of course, leave the Allied Purchasing Commission in its present state, unless the reorganization of it was deemed advisable; but that could later be determined.

Mr. Baruch believes that it would be easily possible to concentrate this entire purchasing function in one man. If that could be done, and the power were vested in the chairman, the agencies

now established could continue to perform all of the work, except the final decisions which would then go to an individual.

The civilian members of the War Industries Board as now composed would be assigned functions in connection with compensation and price determination, and the military and naval members of the Board would, of course, in any event be replaced by those persons who under the reorganizations which have taken place are more appropriate as aids to the chairman in the solution of his problems affecting the several departments.

By this process the single representatives of the War, Navy, Allied, and Shipping Boards could meet, clear the difficulties, coördinate their needs, and in consultation with the chairman of the War Industries Board submit their programme for his final allocation, distribution, and judgment.

This plan does not contemplate the actual moulding of specifications and contracts, the industrial follow-up, inspection, delivery, storage, or distribution of by the director of War Industries; but leaves those functions to the strongly organized agencies already established in the several departments, except to the extent which the performance of any of these functions affects the entire programme. Where any such question arose, the chairman, by consultation, could easily arrange conditions to overcome the difference.

The foregoing letter was satisfactory to Baruch, except that he feared that it "was not definite enough as to our thoughts that this agency *should be an individual who decentralizes the execution of his authority*. In this letter you speak of it as a body, which gives the impression that we thought it should be a board, whereas I understood we were both agreed it should be one man."¹ In response to this suggestion Mr. Baker replied that he was sending the President a note which would "clear up any doubt."

A month later, on March 4th, the President took the action which reconstituted the War Industries Board, instead of creating a director of War Industries and Raw Materials. But while the name remained, power was centralized in the chairman, except as to price-fixing. As this was purely an executive act, in anticipation of the passage of the Overman Bill giving the President broad powers of delegation and redistribution of executive authority, it is a justifiable infer-

¹Letter to Mr. Baker, February 4, 1918.

ence that the President preferred the use of an existing designation to one which might raise a question as to whether he was entrenching upon the legislative field. Another consideration might have been the relation of the determined executive reorganization to the bills for the creation of a Department of Munitions, which had been introduced into Congress and widely discussed.

Names do make a difference, after all, and a vitalized War Industries Board might be all that a Munitions Department could be, in practical results, and yet be the child of an evolving executive policy instead of a creation enforced by Congress in response to hostile criticism. It might be added that the designation proposed by Mr. Baruch would have made it easier for him to exercise the powers that were conferred upon him. "Director" has a more impressive sound than "Chairman of the War Industries Board," and it took some time for all who were affected to understand that the chairman after March 4th was as little like the chairman before that day as a lion is like a lamb. Historically, the change of name would have been important because it would have emphasized and marked the emerging of a great, new war control, greater than any of the other special war agencies. The public would have perceived at once what was then only plain to close observers that the instrumentality of industrial control for war purposes had been revolutionized and that a tired, bored, and discouraged committee had been replaced with an industrial dictator, surrounded, it is true, by a board, but a board with no more real authority over the dictator than the Cabinet has over the President; in fact, designedly occupying precisely a similar relation.

It is an interesting fact that on May 30, 1917, nine months before, Mr. Baruch submitted to the President a draft of a proposed general purchasing agency, which was to have essentially the same powers that the War Industries Board eventually received, but with a more authoritative contact with the Food Administration and the Shipping Board (other special war agencies had not then been created) than it finally arrived at. In practice, the lack of close administrative articulation between the War Industries Board and the Food Administration was not harmful, as their spheres

being quite distinct they always coöperated amicably. But the records of the War Industries Board are strewn with distressing instances of failure to utilize the always inadequate shipping facilities in the best interests of the war programme as a whole, because it was the Shipping Board itself instead of the industrial control agency that determined how shipping should be allocated.

It is not to be implied that there was any conflict between the two bodies, but they were so interwoven in their fields that the War Industries Board should have had the initiative in the disposition of available shipping according to the degree of necessity indicated by its survey of the whole internal and external war situation. Although there was much improvement in coördination between the two agencies as time went on, it is an indisputable fact that the great principle of priority according to national need was never fully applied to shipping, with the result that the Shipping Board was always confronted with conflicting demands for tonnage, which it met in piecemeal fashion; frequently satisfying new demands by withdrawing ships from more necessary services.

The Railroad Administration seems to have comprehended so fully the basic idea that the railways were merely an intra-mural transport instrumentality for the Nation, conceived as a single producing unit for war, that there was no necessity for any formal conveyance to the War Industries Board of final power over them. McAdoo and Hines promptly shaped transportation to all requirements of the War Industries Board.

The Fuel Administration should have been directly under the War Industries Board, for, while there was remarkable team-work and absolutely no conflict between them, the separation of authority over coal production and distribution from the general industrial executive resulted in a degree of lost motion and lost time.

The War Trade Board was eventually fairly effectively tied into the War Industries Board, but it is now plain that there was a succession of confusions of function and powers between these two bodies which occupied a field that was in its nature not divisible.

These defects in the general war machine were the inevitable result of evolution mixed with definite legislation. The offsetting advantage is the probability that no *a priori* statute could have effected so adaptive a composite as was finally achieved.

The work of the Board finally resolved itself into twelve well-defined functional parts or implements of utilization of its various powers and discharge of its duties. These were "Priorities," the Clearance Office, the Conservation Division, the Resources and Conversion Section, the Industrial Inventory Section, the Facilities Division, the Advisory Committee on Plants and Munitions, the Labor Division, the Technical and Consulting Section, the Purchasing Commission for the Allies, the Division of Planning and Statistics, and Price-Fixing. The direction of these functional implements found its data and its media of contact with industry in (ultimately) some sixty commodity sections corresponding to as many groups of industries. Thus the field of the Board's work was divided into twelve agencies of purpose on the one side operating through sixty "action" sections.

Coming now to the administrative method by which functions were exercised and tied in with the chairman at one end and the commodity sections at the other, we have first a Board of ten members, which at the signing of the armistice consisted of Mr. Baruch, chairman; Alexander Legge, vice-chairman; E. B. Parker, Priorities Commissioner; R. S. Brookings, chairman of the Price-Fixing Committee; G. N. Peek, Commissioner of Finished Products; Rear Admiral Fletcher, representing the navy; Major-General George W. Goethals, representing the army; J. L. Replogle, Steel Administrator; Hugh Frayne, Labor Commissioner; L. L. Summers, technical adviser. H. P. Ingels was secretary of the Board, and H. B. Swope, Clarence Dillon, Harrison Williams, and Harold T. Clark, assistants to the chairman. Harry P. Bingham preceded Mr. Ingels as secretary. As administrators all members of the Board except the army and navy members (whose function was not at all administrative) and the chairman of the Price-Fixing Committee were directly subordinate to the chairman, who, however,

was a member of the Price-Fixing Committee. Under Commissioner Parker were the Priorities Board and the Priorities Committee and the non-war construction section. The Price-Fixing Committee had no directly subsidiary bodies, but worked with the different commodity sections regardless of their administrative location. Mr. Legge had the Requirements Divisions, the Clearance Office, the Allied Purchasing Commission, certain raw materials sections, a number of other sections, and the special advisory committee on plants and munitions. Mr. Peek had five groups or divisions of commodity sections and the Facilities Division; Mr. Frayne had, besides the duty naturally falling to his office, the War Prison Labor and National Waste-Reclamation Section; Mr. Replogle had certain sections relating to steel; Mr. Summers had all technical matters. The Conservation Division was not headed by a member of the Board, but operated directly through its chairman, Mr. A. W. Shaw, under Mr. Baruch.

It will be observed that there is considerable conflict of nomenclature in respect of sections and divisions and that the administrative chart shows such an important function as that of resources and conversion far away from the head, but that is the fault of the chart rather than of the fact. The different phases of function and commodity organization will be discussed and analyzed in the chapters devoted to the functional divisions and commodities, but an important general concept to keep in mind is that the War Industries Board was not a neat little administrative bureau trimly set apart. Through membership in the Board or its committees, in its divisions and its sections, virtually every department of the Government and all the other special war agencies were directly connected with the chairman of the War Industries Board. Every civil ramification of the tentacular war machine thus came under his influence if not his control — for by helpful courtesy if not by authority some of the functions of every department of the Government were made subsidiary to the judgment of the War Industries Board.

It thus became the central "control" of finance, internal commerce, foreign commerce, domestic industry, foreign and neutral industry, shipping, railways, fuel and food, and the

army and the navy whenever the discharge of its basic functions made it necessary for it to be such. Herein was the finest fruit of an evolved rather than legislatively created organism. Being without statutory definition and limitation, it grew, fed by what it did or must do, into the direction of all things pertaining to the prosecution of the war. Wherever it penetrated, it was so much its own manifest justification that it never gave offense. No formally created department of the Executive could have been so adaptive, so permeating, so all-inclusive without friction and without offense.

So quiet and unobtrusive were the extensions and projections of this central control that to this day there is little general understanding that through the War Industries Board the United States had in the end a system of concentration of commerce, industry, and all the powers of government that was without compare among all the other nations, friend or enemy, involved in the World War.

It was both the peculiar characteristic and the high merit of this organization that it was so interwoven with the supply departments of the army and navy, of the Allies, and with other departments of the Government that, while it was an entity of its own, exercising virile authority, its decisions and its acts, if not always representing the unanimous judgment of all officials and agencies of Government involved, were always based on a conspectus of the whole situation. At the same time, through the commodity divisions and sections in contact with responsible committees of the producers of the commodities dealt with, the War Industries Board extended its antennæ into the innermost recesses of industry. Never before was there such a focusing of knowledge of the vast field of American industry, commerce, and transportation. Never was there such an approach to omniscience in the business affairs of a continent.

Thus the War Industries Board knew currently all that could be known of war demand and all that it was humanly possible to gather concerning the resources and facilities with which to meet it. This universal understanding was amalgamated with an executive administration which, by the exercise of clearly defined functions, effected the orderly meeting

of supply and demand, of resources and requirements. All comprehensive in its knowledge and understanding, coöperative and tolerant in its relations, clear and definite in purposes and the means thereto, prompt and firm in execution, the War Industries Board stood forth in its final form as the supreme incarnation of the economic power of the Republic, disciplined, coöordinated, and stripped for war.

CHAPTER IV

THE PERSONAL ELEMENT

Baruch — Conscripting the brains of industry — The dollar-a-year man arrives — Seeking the industrial doer — Willard — Scott — Legge — Peek — Replogle — Parker — Brookings — Summers — Frayne — Fletcher — Johnson.

ADMINISTRATIVE and executive organizations susceptible of beautiful charting, that shows each duty, authority, and function as definitely defined and as reciprocally articulated to each other and the controlling head center as the parts of physical mechanism, do not make such entities any more than finely phrased constitutions make nations. The Constitution of the United States did not make the great Republic and the constitutions of its many imitators have not sufficed to remake them.

Full-fledged in the end in its endowment of effective power, however miscellaneous and piecemeal that endowment was, the War Industries Board would have failed had it not been for the exceptional quality of its personnel. The writer came out of war work with no more definite belief than that. It was undoubtedly the greatest gathering of able business men into a single public enterprise necessitating energetic and continuous effort by each and all that this country, and, indeed, the world, has ever known. If you can visualize a convention of able, if not the ablest, men of affairs of America — not so much the presidents and chairmen of boards, whose hard-working days are over, but the keen, dynamic, forceful, purposeful, transilient vice-presidents and managers and superintendents; not the men who are reputed to be doers, but the real doers of the colossal deeds of the titanic American industrial scene — removing their coats, rolling up their sleeves, and marching in a body to take agreeable, assigned positions in a super-corporation, you will view the War Industries Board.

When one reflects that it was such a unique group that for months on end thought and toiled for the public welfare,

without pay or thought of substantial reward, he is prompted to speculate on what might be accomplished by the collectively powerful but feebly acting machinery of the State if such men were to administer its affairs. Manning the War Industries Board, led by a man with a touch of genius, they bridged with the personal element all its organic lapses and filled with intelligent initiative all hiatuses of power.

Somewhat anomalously, it might be thought at first glance, the man finally chosen to direct this supreme executive of industry was not himself an industrialist. Baruch was primarily a speculator and later a creative investor. He was neither a captain of industry nor a merchant prince. He had never created a great industrial organization nor administered a large business. He had had no complex executive experience. Great as was the wealth he had amassed, he virtually kept no books. Vast as was his information of American economic matters, the principal repository of it was in the card index of his mind.

But though Baruch was not of industry, he knew it and had that very substantial proof of knowledge — a fortune gained in applying it. From an external coign of vantage in the Congress of American business in Wall Street, he had studied American business with the cold detachment of one seeking to profit from knowledge. He had examined industry as a biologist scrutinizes life — organically and functionally. He developed a somewhat startling ability to deduce facts from figures and the event from the process. Facts gathered, deductions made, he was unswerving in backing his judgment; he was immune to panic and impervious to the excesses of enthusiasm. Unaffected by the street gossip that rallies or disperses the common run of speculators, Baruch was as sensitive as mercury to heat and cold to all the elemental facts, rising from a continent of industry, that in the long run determine all values. Cool in judgment, remorseless in decision, methodical in action, he is nevertheless a man of susceptible emotions, impulsive, kindly, sympathetic, of extremely catholic human interests and completely devoid of pride of purse. He made his money in Wall Street, but he took neither his politics nor his economics from it.



Bernard M. Baruch

Chairman of the United States War Industries Board; Member of the Advisory Commission of the Council of National Defense in charge of Raw Materials, Minerals, and Metals; Member of the Allied Purchasing Commission; Member of the Supreme Economic Council

As with the source of his ability, so was his ultimate interests in things and in people. He was a Roosevelt adherent when Roosevelt was anathema in the high places of business; he was an early supporter of Woodrow Wilson and "the New Freedom" when big business was scornful. A conservative at twenty-five, he was a liberal at forty. His substream seems to have been Americanism. Apprehensive that war was on the cards, he began as early as 1915 to reflect on the relations between modern war and that huge camp of industry with which he was so familiar from coast to coast. He was the first subscriber to Leonard Wood's Plattsburgh Training Camp, and, in that same year, he called on President Wilson and made suggestions regarding the shaping of industry for its part in the shock of battling nations that went to the very roots of the matter. It is characteristic of him that, though he had supplied generously sinews of war for the Democratic national campaign of 1912, his first call at the White House was purely impersonal and on the business of the public.

His appointment in October, 1916, to serve on the Advisory Commission of the Council of National Defense was as welcome as it was unsolicited. He began forthwith to apply to the inevitabilities of the hour all his great knowledge and understanding of the resources of America, much as he had formerly applied them to the conflicts of Wall Street. He gravitated naturally in the Commission to the ultimate sources of economic power — to raw materials and facilities of their conversion to use. With his grasp of them, with his wide and deep understanding of industrial processes, ramifications, and interdependences, he was peculiarly qualified from the beginning for the place of power that ultimately came to him.

Baruch reveres facts. He applied laboriously collected and carefully digested knowledge to a Wall Street that ebbs and flows to the impulse of rumors and reports, and netted his fish indifferently with the outward or the inward current. In a Washington of "guess" and "estimate," "think" and "about," he pursued the definite decimal-point fact. His great conception of the commodity sections came from his profound belief that first of all there must be reliable knowl-

edge of the factors of all war-time problems. With the commodity sections behind him, he had the facts, as nobody else had them. Digested by his penetrating power of analysis and applied with his airline judgment, he had a grasp of everything he dealt with in Washington that really put him in a higher rank than any of the great captains of industry.

It is something of a mystery that the President, knowing and appreciating Baruch as he did, did not lean more on him and advance him more rapidly to the high command of industry mobilized for war. The truth probably is that he feared that in public estimation Baruch was too fresh from Wall Street. On the other hand, Baruch, though ardently ambitious to participate in the world of effort, is not a good self-promoter. Whether it proceeds from affectation or modesty, the one-time brilliant Wall Street operator seems to be positively timid in his first mingling with a new environment. Assigned to raw materials, of which coal is perhaps chief, he unprotestingly surrendered it to Secretary Lane, from whom Secretary Baker took it away, with the result that a separate coal administration arose. He excused this surrender later by saying that coal was a "porcupine that he was glad to let go of." He must many times have wished that same porcupine, quills and all, back in his hands. Whatever the cause, the fact remains that the man who could certainly have done in the fall of 1917 what he did in the spring of 1918, was passed over for many months after he had demonstrated to all close, unprejudiced observers that he was marked for leadership.

There is some unwritten history here that has never been and may never be told. It is known that early in the war President Wilson had the intention of making Mr. Baruch general purchasing agent for the Government. Yet, in the latter part of 1917 and early part of 1918, when Baruch was the logical man to have thrown into the industrial gap, and the War Department was beginning to utilize Mr. Stettinius, the President waited and deliberated for months. It was not only that he did not raise up the man, but that he let the place drift and disintegrate, though Mr. Willard, with clear insight, had pointed out to him that the one thing to do was to amputate the War Industries Board from the Council and

launch it, surcharged with authority, against the menacing disorders of the period.

The indecision was likely the product of tangled congeries of doubts and conflicting policies and personalities. There was the pull for a Department of Munitions, there were antipathies to Baruch, aroused among many close to the President by Baruch's original ways of getting things done — and there was still the bogey of Wall Street origin, which had not been dissipated by the unparalleled success of Baruch in effecting, by appealing to the patriotism of Wall Street, slashes in the prices of copper, nickel, tin, lead, and steel, that set the fashion and moulded the motive of war coöperation.

The President's hesitation is all the more perplexing when it is considered that Baruch was near to him and that he was near to Baruch. The chances are that Baruch could have tipped the scales to action by a single picturesque sentence in his own behalf. It is probably to be put down to his debit that he did not submerge personal advancement in the cause of the public good. In a time of clashing worlds and smashing customs there was no place for personal diffidences, however honorable to their possessor. He knew the crying demand for leadership, and was conscious of his own capacity for it. He was by then attuned to public life, and yet he did not push himself forward when to do so was public duty.

Besides his natural qualities and his peculiarly fitting experience, Baruch had certain advantages when he did come into power that none of his predecessors had. His great wealth was a distinct asset. It made him independent of the material considerations that would have harassed a poor man in his place. The nature of its acquisition made him independent of all bias or obligation to the "interests." The bigness of it put him on a plane of equality and familiarity with all comers. Sixty million dollars, incarnate in Judge Gary, opulently set in the two billions of the Steel Corporation, in Baruch's eyes bred none of the dignity that doth hedge kings. He had no past favors to reward or future benefits to cultivate. His fortune was stuck to none of the great interests. He had never drawn a huge or any salary or emolument from any of them. He looked forward to no

associations with them. He was of Wall Street, but he was its Ishmael. He had made his money by pitting his knowledge of men and things and his judgment of events against those of the greatest masters of industry and commerce. He respected the monarchs and nobles of the realm of industry and finance, but they had no fears or favors for him. For him they wore no halos and emitted no sanctities. Perhaps it was because he accumulated his wealth by raiding their preserves that he became a Democrat in politics and something of a radical in economics.

But regardless of his unafraidness, his practice of equality, there was an advantage to Baruch derived from his wealth and his business success. Poets esteem each other according to the merit of their verses; men of affairs measure each other by dollars. The chairman of the War Industries Board was rated high by that standard. Although he was on the opposite side of the table, big business men liked to deal with him because he talked their language, even if he did it to their disadvantage. He was not saturated with theories lacking the heat treatment of practice. He dealt with facts and with experience. Instead of preaching he traded, instead of commanding he bargained.

The peculiar quality of his bargaining as a Government representative was that he was able to invoke sentiment. In more sordid times it might or not have worked. In the war it circulated at par. Cynics scoffed then and will scoff now — but it is a fact that business came to serve partly for the meed of service. This was truer of the basic industries — with which Baruch primarily dealt — than it was of the secondary ones. He would not tolerate profiteering. Placed at the head of another War Industries Board in another war, Baruch, as his report says,¹ would draft dollars as well as men from the start. As it was, his drafts of industry were extensive.

Here, too, his hands were free. He had drafted himself and his dollars. He so arranged his affairs that not a dollar of profit came to him out of the war. If there was doubt, he gave the Government the benefit and turned the dubious item over to the Red Cross. In the case of one great industry

¹*American Industry in the War*, p. 81.

in which he had a large interest, an industry that was making a product which the Government must have, he directed that the company should supply the Government on an absolute cost basis. He gave the Government all his time without compensation and retired altogether from active business. When he might have doubled his fortune in Wall Street in years that were open doors of speculative opportunity, he was as out of it as if he had never been in it and was spending his reserves — in more than one instance — in paying bills that were really Government charges. Nothing was delayed because of a lack of appropriation if Baruch knew it. An example in point will be related later in connection with that lively and super-efficient projection of the War Industries Board, the Foreign Mission.

Baruch had one very important external advantage that his predecessors did not have. He had warm supporters in high places. Not only was the President for and with him, but McAdoo, Secretary of the Treasury and Director-General of Railroads, with one hand on the till of the mightiest of all treasuries and the other on the throttle lever of the greatest of all transport agencies, always stood behind Baruch like a brother. In any moment of doubt or weakness, McAdoo, speaking for vast powers, was there with substantial reinforcements.

All who came in contact with Baruch when he was chairman of the War Industries Board were impressed by his simplicity of motive. Inspired by patriotism of the highest and intensest order, he had one single objective — the winning of the war. His mind had no room for intrigue and the advancement of personal ambitions, large or small.

Aside from the contributive value of his environment and experience, Baruch possessed inherent qualities that fitted him for his great office. One of these was his unfailing, good-natured, tolerant patience. All of his associates comment on his patience. His good-humor was unfailing. His smile was perennial; he was never too tired or too engrossed to smile. Optimist that he is, that smile must many times have masked a profound depression. Baruch's power of swift and unqualified decision, which was one of the greatest factors in his success with the War Industries Board, is the

child of his courage. He never quailed before any responsibility of decision no matter how momentous. Reference and deference are the curses of lumbering bureaucracies. Impressed with the importance of decision, it was Baruch's habit swiftly to assemble the facts and arguments and quickly decide. President Wilson was not lacking in decision, but he was wont to wait for events to unfold more data. Baruch took the current data and decided, well understanding that paralysis is more dangerous than error.

Simplicity of manner was another quality that helped him greatly. He took on no airs with power. A certain boyishness marked all his doings. He worked with zest and not with carking care. He liked it. He was never too pre-occupied to ignore small talk. Whenever possible, he renewed his strength from social intercourse. Not much given to press-agenting his own activities (too little so for his official impact, in the writer's judgment), he delighted in the daily meeting with the newspaper men. With them he chaffed and was chaffed. The strain was great, but it was a great game.

Wall Street was a little thing to playing with the resources and facilities of a nation and of nations. Negotiating with Chile for nitrates or with Spain for mules for Pershing was high adventure. To get the nitrates he "beared" them with plans for synthetic nitrate; to get the mules he "bulled" the ammonia that was exchanged for them. Jute could not be obtained from India, it seemed, because India was an independent empire which could not be controlled from London; but London found a way to control when it was made plain that America might not be able any longer to pour silver into the Indian mints. Truly this was an absorbing rôle for a prince of traders.

Life in the War Industries Board was a succession of big things, full of thrills. Baruch, nervous and impulsive, found full outlet for his impetuous energies and the outgo kept him cool and calm. The procession of great enterprises left no opening for staleness. With no natural talent for detail, indeed, with a distinct dislike of it, Baruch had developed a great capacity for it. His photographic memory, which is automatic and records without concentration, leads

him to a neglect of even systematic personal records and files. Lost papers in the War Industries Board were usually found in Baruch's pockets after futile search had been made everywhere else. He knew their contents, but had forgotten that they were in his pocket.

His passion for accuracy might have led to his undoing through a blinding absorption in detail, if he had not surrounded himself with able lieutenants. But here another quality came to his aid, and that is his almost unfailing judgment of men. He picked masterful minds to be his coadjutors, and so great was his confidence in his judgment that he conveyed to each of them in his particular field all the authority he had received — and more. And this suggests a diversion. Baruch was deeply impressed with the idea that a nation at war has so much at stake that the rigidity of laws and conventions of peace are automatically and necessarily suspended — that the preservation of the nation becomes a law above constitutions. He found his justification in Lincoln, who thought it more incumbent upon him to preserve the Nation than the integrity of the Constitution. Baruch gave authority and credit and took all the responsibility without hedging or reneging. His lieutenants never feared a fire from the rear.

They were all well adapted to the central idea of industrial self-control for patriotic purposes. They were from industry and would have resented dictatorial methods had they remained in it. They knew just how the men at home felt. They were also simple, democratic Americans. A surprisingly large number of them came from the Middle West, Legge, Peek, and Shaw, for example. Naturally they would have favored regulation of industry by consent rather than by rigid rule, even if the evolution of the War Industries Board from the nucleus of voluntary help instead of from superimposed law had not given it that character long before it had teeth. They fitted admirably into the conception of industry imposing from its best judgment its own rules and regulations and self-administering them.

The War Industries Board was the least bureaucratic of organizations. It was really the town meeting of American industry curbing, disciplining and devoting itself. There

was the result that the greatest of the industrial nations eventually exercised a more far-reaching and compelling control of industry than did any other of the warring countries, and yet accomplished it at a comparative trifle of overhead and with a mere handful of executives and a few hundred clerical helpers — not as many persons on the official roll, all told, as a single bureau of the British wool control had. American industry virtually imposed on itself, through the clearing-house of the War Industries Board, its own rules and then policed itself with a view to their enforcement. It is to the everlasting honor of American business and to the vindication of our democracy that the rules were better for the public interest and better enforced than like ones among friends or enemies.

When the end of the war came, it did not find American industry enmeshed in war-time laws and regulations which it would take years to shake off. On the contrary, about all it had to do was to relax its own rules and change its objectives from those of war to those of peace. In the writer's opinion, the change was made too abruptly, but that is another story. It cannot be said too often — and there will be reiteration of it in this book — that the original feature of the War Industries Board was its successful, coöperative, democratic, self-control of industry for national purposes.

Baruch had an instinct for management that more than made up for any lack of executive experience in connection with great administrative machines that might have been his. Having entrusted power to his chiefs and sections, he kept out of sight. He discouraged any tendency to pass matters on to him for the final visa. He absented himself from committee and subdivision meetings where he might well be expected to appear because of the major importance of the things under consideration. Even in such cases he did not reserve the right of veto. Only in the event that his lieutenants could not decide because they could not agree did Baruch intervene. These methods of procedure worked wonders in putting driving power into the work of the War Industries Board. The paralyzing fear of reversal by a higher authority was removed. Decision being concentrated

became strong. Not participating in the work of his department chiefs, Baruch remained detached; advantageously placed to view the whole machine, see its external contacts and steer its general course. Not brought into personal friction with champions of conflicting or obstructive business interests, Baruch in the background was the bogey man, the final repository of power, the Zeus of the Olympus of Industry who was to be propitiated by settlements instead of appeals; whose portentous potentialities were not to be lightly invoked.

People soon learned that with Baruch at the head of the War Industries Board, it was useless to insist on seeing the man higher up in preference to a divisional chief. It was not hard to see Baruch, if they insisted, but they learned that it was a waste of time — for in this organization the men lower down did not merely interview; they decided, not as the basis of an appeal, but as finality itself. Sub-executives who are forever subject to appeal and frequently to reversal cease to be executives in initiative as well as in performance. Preferring error to inaction, Baruch did not expect perfection of his associates; but incompetence was met with elimination, not with correction. It was the only system that would command the devoted loyalty and best efforts of strong and able men, of men who are willing to sink or swim on their records, but who insist on a clear field in their departments.

From this system, which Baruch describes as decentralization of authority (which is, however, predicated on the primary establishment of an unquestioned source of authority and responsibility), flowed a remarkable product of energetic action. "Here is a job," Baruch would say, or indite a hasty memorandum to one of his "boys." He might cite some of the elements and indicate the objective, but as to how the job was to be done he gave no hint. "I'm on the job," would be the answer — and nine times out of ten that was the last Baruch would have to do with that matter. It was off his mind and he was free to go on with his assignments. In this way Baruch, as the great coördinator of governmental instrumentalities, did not fall into the error of littering up his own establishment.

With such a company around him enjoying such a wholesale delegation of authority, Baruch's mind was free to its impulses and intuitions. He could move rapidly at will around the Washington scene, receptive to suggestions, open to thought, and with free outlet and prompt application of the plans that struck fire in his luminous mind. He may be fairly called a great executive. He is essentially a creator, and yet he has a marked talent for inspiring action and devoted loyalty.

Baruch could not have succeeded as he did, however, if he had been merely mind without character. The writer does not always agree with his mental processes — though they are always arresting — but no one who knows Baruch could ever question the integrity that runs like a sensitive current throughout his entire make-up. When the last word is said, it was Baruch's character that saw him through, that and his incessant courage, marvelous intuitive judgment, and patience. The writer freely confesses that he was one of those who, in the early days of the war, doubted the capacity of Baruch to master a situation so full of dynamic and loose ends, and he finds a certain intellectual pleasure in thus recording his final judgment of Baruch's contribution to the war.

The executives of the War Industries Board were mostly young — scarcely any were over fifty — and coming rather than going men. Their names¹ did not always mean much to the public, but they were impressive in industry. They were men in the active middle of their careers; men who were then doing the things that would make them famous later. To a large extent, too, they were independent of patronage for the development of their careers. Either they were not salaried men, or their ability was so conspicuous that they had no cause for worry about their futures. They were able to cut loose from and rise above their previous associations in serving the public.

It should not be inferred from this, however, that, in choosing these younger and more virile executives to act officially for the Government, the counsel and influence of

¹See Appendix for list of War Industries Board executives, giving their business affiliations as of the war period.

the men who loomed greater in the public eye was lost. These older men, these greater figures, at any rate, were of the greatest assistance to the Government on or through the trade committees which represented industry in its manifold contacts with the War Industries Board. In the beginning, in the early days of the Council, it will be remembered, they represented the Advisory Commission directly. The Council and the Advisory Commission did many great things, but they never did a greater one than enlisting the so-called dollar-a-year men. They thus opened the door for ingress to Government of the truly able men of the Nation, who in ordinary times are in business and not in Government.

The ineradicable belief that no man is great enough to rise above the selfish impulses of his own business kept them in the background to a large extent, especially in the early days of the war. There resulted a terrible waste of time and ability. Men of the rarest capacity were doing clerical work in Washington; others were not there at all. But the business committee system made them emergently available, even though not in a publicly conspicuous way. It did more than that. Even when the war service committees were strictly segregated on the private side of the fence and were frankly acting for industry rather than for the Government, every one of them had a great consciousness of an over-topping public duty. First to last, through this invocation of the great ability of America, all the knowledge, all the experience, all the energy of the greatest pool of strong men to be found in the whole world was available. As the war went on, the public came to demand the services of these men, regardless of the ancient prejudice — and so men like Baruch, Stettinius, Lovett, Schwab, Franklin, John D. Ryan, and many others of their caliber were called to the front-line trenches of industry in the war. The reluctance at first to give power to those who could use it, for fear they would abuse it (and delegating it to those who did abuse it because they could not use it), is one of the reasons why the war machine took time to evolve. It is doubtful, though, the popular mind being what it is, whether either Mr. Willard or Mr. Baruch could have “got away” with the appointment of Judge Gary as steel administrator, so conspicuously the master was he of his great industry.

It was in the coming out of these men — the private earning capacity of their kind in the War Industries Board alone was said to have been \$35,000,000 a year — that democracy was vindicated. Germany was collectively efficient and ready for war because she was ruled by an oligarchy that took thought and pains. The United States was collectively — meaning the State — inefficient and unready because it was ruled in peace by the crowd, which does not take thought. The best minds of Germany were in the State in time of peace; the best minds in America were not in the State. But the State did the thinking for all Germany and attended to all initiative; hence there were slender reserves of ability outside the bureaucracy and the talent within had become mechanized by discipline and routine.

The United States, on the other hand, had an almost unlimited reserve of executive, technical, and professional ability which was of exceptional value just because it had not hitherto served the State. In the emergency it turned to the work of the State with zest, refreshing originality, and keen vigor. If we could always have such men in public life and service, we should be blessed with a government efficient and beneficial. But it is the paradox of the problem that, if we had them there, we should not have them swarming in industry and building up reserves of talent subject to call. Democracies pay for private efficiency with public inefficiency.

There were many men in the Government service, not technically dollar-a-year men, who were of the same type and whose sacrifice was greater. These were able men of large earnings or salaries, but without sufficient savings to stand a long period without income. They accepted the small salaries, rarely ever more than three thousand to six thousand dollars, that it was possible to pay them, and reduced their living scale accordingly. One man, for example, who had been drawing a salary of twenty-five thousand dollars a year, lived in a hall room in Washington and patronized the cheap restaurants in order to serve the War Industries Board. For some of the dollar-a-year men there was no great personal sacrifice. Some had independent fortunes and others had their burden assumed by their

former employers. Some of the men who were able to carry themselves did, however, make a tremendous sacrifice in that they not only gave a year or two of time in the best periods of their lives, but deprived themselves of unequaled opportunities to make fortunes. In Washington they lost opportunity, worked in obscurity, and in some instances suffered undeserved disgrace. One such executive gave up salaries amounting to eighty-five thousand dollars a year and certain profits several times as large.

It was one of the important functions of the Advisory Commission that it served as a clearing-house for the services of men who were eager to help. The man and the place were brought together—not only in the Commission's own sphere, but throughout the Government; for in the war establishments and in all the regular departments and special war agencies there was an almost unlimited demand for executive ability that could not be met through civil service channels. For many months the Advisory Commission was about the only center in Washington where there was anything like a clear general view of the multitudinous activities of Government in the great emergency, and it was thus of vast assistance, not only in supplying needed men, but also in giving needed information to thousands of bewildered persons who were endeavoring to find out how they could assist in their private capacities as manufacturers and professional men. To depart a little from the clear course of this discussion, it might be added that the Advisory Commission acted similarly as a clearing-house of information, suggestion, and inspiration to the whole country.

"History will never be in a position," says an editorial in the "New Republic," "to chronicle, because these last four years have glutted it with centuries of material, all the heroic deeds at the front, or all the sacrifices behind the lines; and while our dreams may never become more tangible than dreams, and the 'Business Administration' still be a goal for the aspiration of future generations, the foundation has been laid and the material proved to be available in the existence in our national fabric of the qualities which are personified these days in the 'dollar-a-year man.'"

Daniel Willard deserves a high place on the record of personalities. In a way, and consciously, too, he made a supreme personal "sacrifice hit" for the War Industries Board. It has been explained how in the "dead center" times of the fall of 1917, when evolution was not evolving, this executive, displeased with the lack of progress, the delay in centralization, the oozyiness of industrial control, and his failure to secure the authority that he knew was indispensable to success, decided to resign and go back to the president's office of the Baltimore & Ohio Railway. The great thing about this resignation was that it was a personal sacrifice. He left the office to make it. He could not get authority, and no big man would therefore take it, as it was, for the same reason that Willard left it.

It has been said that one reason why the President did not accept the suggestion of the creation of a Department of Munitions was that it required a superman at its head — and he could not find one. If there were no supermen, there were some exceptional men, and they would not accept positions of super-names and inferior authority. By his resignation Mr. Willard thus forced the caliber of the War Industries Board chairmanship up to an equality with great, if not superman, ability pending the discovery of the superman. So Baruch got what was denied to Willard.

The masterly manner in which Willard, as chairman of the Advisory Commission, initiated and directed the prevention of the threatened general strike of railway men on the eve of the war, and his work in mobilizing voluntarily the transportation facilities of America under private management, are enough to give him a great place in the history of the war behind the lines. As the railways were taken over by the Government at the end of 1917, the railway men have not been given latterly so much credit as they deserve for what they did voluntarily in promoting the successful waging of the war.

Despite the representations of the Attorney-General, who was intent upon enforcement of the laws that operated to keep the railways from acting together in the manner demanded by the necessity, the railways achieved wonders in unification of transportation. On the slightest suggestion



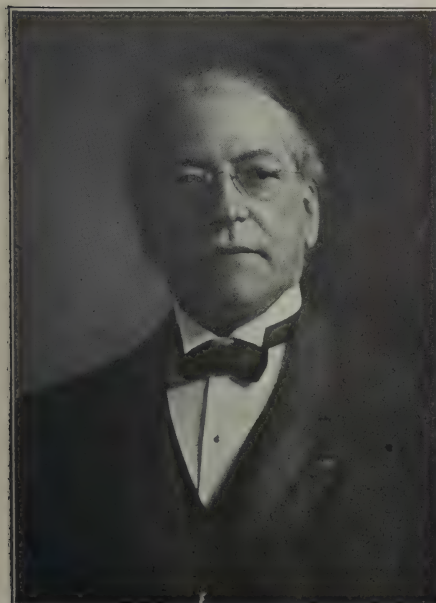
DANIEL WILLARD

Chairman of the Advisory Commission of the Council of National Defense and the second Chairman of the War Industries Board



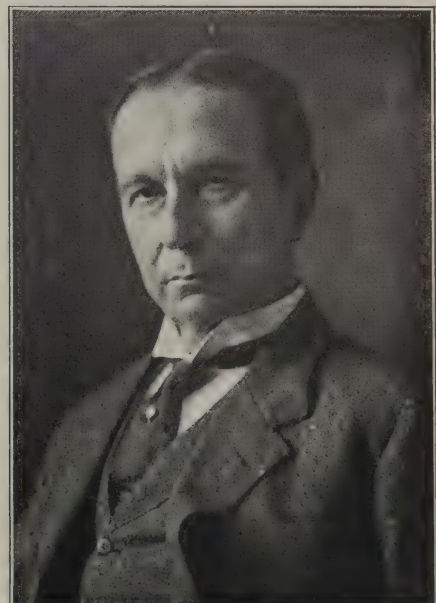
FRANK A. SCOTT

The first Chairman of the War Industries Board



SAMUEL GOMPERS

Member of the Advisory Commission of the Council of National Defense representing Labor



ROBERT S. LOVETT

Member of the War Industries Board in its early organization

from Mr. Willard, 631 railway companies, operating 262,000 miles of line, were devoted primarily to Government service—and the general administrative expense involved was met by them. For eight months, an executive committee that came to be known as the Railroads War Board sat continuously in Washington, ready to respond to every suggestion that might be made by Mr. Willard acting as contact officer for the Government—and this board, with Mr. Willard and Interstate Commerce Commissioner E. E. Clark added to it, was also the central committee of the Council of National Defense on railroad transportation. There were, besides, six regional and other committees continuously on the job.

The war was but five days old when this committee was created at a meeting of the executives in Washington called by Mr. Willard in response to a resolution adopted by the Council of National Defense introduced by Secretary Lane. Without delay or consultation with directors and stockholders the executives that same day adopted this resolution:

Resolved, That the railroads of the United States, acting through their chief executive officers here and now assembled, and stirred by a high sense of their opportunity to be of the greatest service to their country in the present national crisis, do hereby pledge themselves, with the Government of the United States and with the Government of the several States, and one with another, that during the present war they will coördinate their operations in a continental railway system, merging, during such period, all their merely individual competitive activities in the effort to produce a maximum of national transportation efficiency. To this end they hereby agree to create an organization which shall have general authority to formulate in detail and from time to time a policy of operation of all or any of the railways, which policy, when and as announced by such temporary organization, shall be accepted and earnestly made effective by the several managements of the individual railroad companies here represented.

This is not the place to go into the history of the great achievements of the railways thus unified for war service, but the prompt and comprehensive manner in which it was done does great credit to the patriotism of the railway executives and throws light on what manner of executive

Daniel Willard was in the Government service. The country was profoundly stirred by the speedy and frictionless mobilization of the railways. It was dramatic in gesture and practical in action. It must not be forgotten that it was all done before the military establishments had given any thought to the transportation involvements of war. One wonders if it would not have been better in the end if the principle of democratic coöperation and control had been applied throughout to the railways, as it was to industry.

It was largely due to Willard's good temper and steadiness of purpose that the Advisory Commission had no destructive dissensions and that able men were held in the War Industries Board in the period of doubt and delay, and it is chiefly due to his recommendation, supported later by his sacrificial resignation (there was literally nothing peevish or disgruntled about it, as is shown by the fact that at the request of the President he continued as chairman of the Advisory Commission), that the War Industries Board was made independent of the Council and infused with power. It was not for Mr. Willard to have the honor of being in at the "kill" in the War Industries Board's long struggle to dominate the economics of the war, but a study of the records of the Council and the Advisory Commission and the accounts of his associates reveal that in many fundamental ways he prepared the foundation, even outside his special domain of transportation—which is the supreme "facility" of the utilization of material and *matériel*—for the later effective functioning of the War Industries Board.

Trail-blazers usually experience more hardship than honor. Often their mistakes in an uncharted field are as honorable as the accomplishments of their successors. The superstructure is more obvious than the foundation. Frank A. Scott, chairman of the Munitions Standards Board, chairman of the General Munitions Board, and first chairman of the War Industries Board, was one of the pioneers in building the American war machine, and he was one of the sacrifices to its grinding labors. His health failed before the machine was complete. He would not have been the best man to direct the finished War Industries part of the machine. He himself, with a singular and somewhat

moving generosity, has said that probably it was an excellent thing that he broke down to be succeeded eventually by Baruch. However that may be, he was thought to be peculiarly well adapted to the pioneer work that fell to him.

A student of military matters from boyhood, he became, as a manufacturer, deeply interested in the industrial implications of war. He knew what such an efficient nation as Germany would logically do in an industrial way to prepare for war. On three different trips to Europe before 1914, he carefully studied the production of military *matériel* in England, Russia, Germany, France, and, in a minor way, in Italy. As early as 1909 he came to the conclusion that Germany was preparing for a war of conquest, and that she would so overtop her immediate enemies, owing to her industrial preparedness, that the United States would be forced to join the league against her in order to prevent Germany from becoming the world's dictator.

The extraordinary development of by-product coke ovens in Germany, and even in England by German capital, indicated that Germany was planning far ahead for a great supply of the ingredients of high explosives. Scott found like signs in the development of the dye industry and the building of plants for the fixation of nitrate. The discovery in the winter of 1914 that Germany had placed orders for a certain type of turret lathe, used in the production of fuses, on such a scale that it would have absorbed the entire annual capacity of the United States, absolutely confirmed in his mind the opinion arrived at in 1913 that the war would begin in 1914 — an opinion that was even then so near a judgment that Mr. Scott caused his own company's turret lathe plant to be made ready for the orders that he was sure would soon be coming from Germany's enemies.

When the war came, he shipped lathes to England without waiting for orders. He became one of the Ohio committee members of the Industrial Preparedness Committee of the Naval Consulting Board, and was, therefore, in the midst of an enterprise that dovetailed into the munitions programme of the Council of National Defense when the United States entered the war. He undertook the duties of chair-

man of the Munitions Standard Board and of the General Munitions Board with the greatest zeal and performed them with boundless energy, finally paying the price of collapse, and becoming one of the many and little honored civilian casualties of the war.

A man with such an experience and such a foresight was presumably specially qualified to coöperate with the army and navy in planning and stimulating the production of munitions in this country. He may have put munitions proper out of perspective with the general industrial background, but it required a tremendous emphasis on the source of requirements to bring out the basic effects. These soon emerged and then the General Munitions Board was merged in the greater War Industries Board. Mr. Scott was throughout a firm believer in the creation of a civilian organization that would complement the army supply system instead of superseding it. It is probable that it was due to him that the Executive decision did not swing to a department of munitions in the first two or three months of the war. He had a high opinion of the capacity of the regular army officers, and his consequent friendly relations with them did much to cause them to welcome in an increasing degree the assistance of the War Industries Board. The eventual evolution of the Board conformed to his original conception of a civilian organization that would be a coördinating body standing between the army and navy and other war instrumentalities and industry, but went farther, because in its field it became commanding.

With all his understanding, Scott did not achieve complete success in the War Industries Board and could not have succeeded, because he was too respectful of the army. A uniform to him was the equivalent of a certificate of superiority in military matters. He clearly perceived the dire need of the army for civilian assistance, but he did not fully grasp the need of civilian domination in supply matters. Baruch is open to the criticism that, perceiving this need, he did not force the issue in those dreary months when the Board was drifting and dying of anæmia; and Secretary Baker was letting the army run wild through the supply pastures and was planning, with the aid of Mr.



ALEXANDER LEGGE

Vice-Chairman of the War Industries Board, Manager of the Allied Purchasing Commission, and Baruch's Chief of Staff. Now President of the International Harvester Company

Stettinius, to create the needed agency through a munitions department within the army, that would have left the War Industries Board a shell.

The discovery of Alexander Legge, and his conscription for the Allied Purchasing Commission and the War Industries Board, constitute a striking example of the chairman's policy of searching out the little known big men of industry. Even in this age of advertising and publicity, it frequently happens that the key men in many great corporations are not known to the world. It is too true that about the time a great executive becomes known to the world, his best days are past. Reputation trails performance. The War Industries Board had to be vital and laborious throughout in order to meet the pressing emergency. It could not afford the lost motion of great names and vicarious deeds. Its executives must be men still in the winning periods of their lives; men who were still business workers rather than business authorities.

On a list of twelve names that Mr. Baruch made up from answers he got to inquiries for "coming men," who would be good material for the general management of the Allied Purchasing Commission, appeared the name of Legge. Baruch had never heard of him. When the list was shown to one of the chairman's associates, he pointed to Legge's name and said: "There is your man, but you can't get him. He knows Europe, he knows human nature, he is a very shrewd trader, he is as straight as a die, and an unbeatable fighter. His is the best head in the International Harvester Company. He is a rare combination of talent for leadership and gentleness."

Cyrus McCormick, then president of the International Harvester Company, which Legge now heads, did not see how he could spare Legge in such troublous times for business. The harder McCormick clung to Legge, the more Baruch wanted him. But in those days there was no resisting the appeal of the country's need. So Legge came to Washington—from the troubles of a great corporation to those of the world. His remarkable success in the larger field was partly due to his wide experience in international business, but more to his profundity of perception and comprehensiveness of analysis. He could tell unerringly and almost

immediately two things about every man he dealt with, namely, whether he knew what he was talking about and whether he was sincere — that is, believed in his own proposition or contention. He thus saved an immense amount of time that men less keen in analysis must inevitably lose.

The members of the various commissions representing the Allies soon appreciated that it was useless to try to wheedle out of Legge something that was not essential. But when they had a real need Legge knew it, and they could always count on him to help. Their confidence in his ability to meet their requirements eventually became so sublime as to be almost pathetic — for those were days when all men met at least occasional defeat at the hands of circumstances.

Legge was as good at analyzing problems as at sizing up men. His mind went unerringly to the key to every situation. Not only could he see a problem in its simplest terms, but he had the faculty of stating his views in the clearest and most convincing way. When he spoke, debate ended, for somehow it almost always appeared to all that he was right. Besides, it was soon known to all with whom he dealt that his decisions were ultimate, unless the circumstances under which they were made were fundamentally altered. Then, too, with him finality was never asperity. A decision clothed in inevitability and gently stated wins willing acquiescence. Such were Legge's decisions—and always impersonal. They were never felt or seen as personal triumphs in a contest of wits and words; they were oracles of the predestined.

Talents are cast in many moulds. Legge had his kind, but he knew that there were others. Asked to recommend the right man for the Board's production department — known as that of finished products—Legge unhesitatingly named his chief personal rival in private life, George N. Peek, of Deere & Company, Moline, Illinois, and of a personality that was the very antithesis of Legge's. The calm, cool, deliberate man recommended Peek, impetuous, impatient, impulsive, explosive. The easy-going type of executive recommended the restless, driving type. Peek was perhaps not such an analyst as Legge, but he was a photographic observer. His mind comprehended every element of a situation and his reactions were instantaneous. It never idled;

it never saw dimly. For Peek the world was a sharp black-and-white drawing. His decisions were as clear-cut as were Legge's, but they somewhat offended; and all the more because they were right. Those who were overborne by them felt the pangs of defeat. But note that the consequences were not harmful. You resented the sting of Peek's commanding dictum, but at the same time you were impelled to go right out and put your shoulder into the collar — "just to show him." He put you on your mettle.

Peek is the type of executive that has an immense capacity for detail without getting lost in it. He sees the trees, but does not overlook the forest. His energy is infectious. Some energetic men tire out their associates, but Peek seemed to radiate energy in the War Industries Board. Legge made you feel that tangled matters would come out all right; Peek made you feel that he would untangle them himself in a jiffy. Clear-eyed and dynamic — George Peek is the type of the best in American business life.

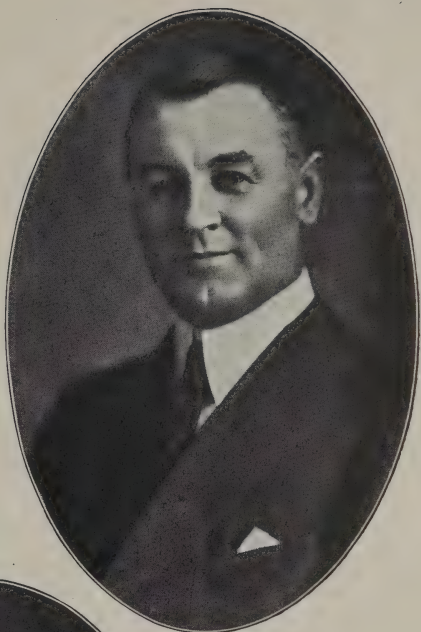
J. Leonard Replogle had a hard place to fill. A young man of high renown in the world of iron and steel, he was called upon to take a position that necessarily brought him into opposition with the chief men and interests of his calling. In serving the Government he stood to block his own career. In such a position a man might err on either side; he might drive too hard bargains for the Government or he might be too considerate of the industry. From beginning to end, Replogle made the public interest first, but he was fair to business. When he entered the Government service he had only one minor interest that could be directly affected by his position as director of steel; that interest lost money throughout the war. As the conserver as well as the producer of steel, Replogle gave a rare exhibition of courage when he resolutely directed the whole steel output of the country to direct or indirect war purposes. Often he had to defend his policy against the great steel corporations as well as against the great users of steel. His complete knowledge of every angle of the business qualified him for this important position. Specious arguments and manipulated cost-sheets meant nothing to him. His position duly taken and fortified with the facts, he stood like a rock against both assaults and impor-

tunities. He forced down prices and increased production; things that the steel men said could not go together.

Judge Parker had a maddening job, but always kept his temper. An able lawyer, yet his genius leaned to conciliation rather than strife. As the absolute lord of priority, his task made his days a continual round of meetings with angry and outraged men. It was as hard for the individual manufacturer to see the whole scheme of things in the war as for the individual doughboy. Both were inclined to think throughout the war that they existed to be discriminated against. It was for Judge Parker to show the suffering individual how his trouble became the general good. Almost invariably he succeeded. With all of a lawyer's respect for law and statutory authority, he was in an office where he had to use a vast authority that could quote no statutes. He had to derive his authority from those to whom he applied it — and he succeeded admirably. He impressed all with his sincerity and lofty purpose and won them by his unfailing courtesy and good-temper.

Mr. Brookings was the only executive of the War Industries Board who was well along in years; but measured by endurance and energy he was the equal of the youngest. A retired business man who had always cultivated a devotion to the service of the general welfare, he naturally grasped the conception early in the war that it meant the complete subjection of the individual to the general interest. From the first, he was a firm believer in price-fixing as indispensable to the satisfactory conduct of the war. A protégé of Secretary Houston, there is little doubt that his insistence on the importance of controlling prices had its effect in the White House. An associate says of him that his fundamental honesty is one of his strongest characteristics. "He is so honest," says this associate, "that he is honest with himself." United to this honesty, which was so obvious that it invited equal honesty, was an exceptional ability to grasp the essentials of the most complex contract or other business relation. Add courage to honesty and ability and you have the qualities that made Brookings the right man in the right place.

Leland L. Summers, who was the technical adviser of the War Industries Board and head of the Chemical Division,



GEORGE N. PEEK

Member of the War Industries Board and its
Commissioner of Finished Products

J. LEONARD REPLOGLE

Member of the War Industries Board and Director
of Steel Supply

EDWIN B. PARKER

Member of the War Industries Board and
Priorities Commissioner

had a profounder insight into the industrial bases of modern armament than any other man associated with the beginnings of the War Industries Board. He was the first technician called into conference by Mr. Baruch — in November, 1916; and it was the exposition of the primary sources of weapons and explosives that he then made that gave Baruch his initial understanding of how modern war is rooted in industry — even in forms of industry that are in the highest degree peaceful. It was from Summers that Baruch learned how correct was his own judgment that there was no successful dealing with the problem that did not begin with raw materials. As the engineer unfolded one line after another of sequences leading back to raw materials, Baruch was stunned by the immensity of the task that would confront the United States in the event of war. He could see no possible way of coping with it except through the virtual incorporation of all industry into the Government, and from that moment the idea of securing the cordial, voluntary coöperation of industry was the idea that informed all of Baruch's plans for utilization of the resources and facilities of the Nation.

Baruch never had greater luck than when he found Summers. Digging into the nitrogen-fixation and coal-tar industries of Europe for years, Summers had struck his pick on the roots of the war as far back as 1911. He uncovered them in the fertilizer and synthetic chemistry industries and found them in the hearts of the German people. Away back then he saw that Germany was amassing materials and strengthening her industries for something grimmer than commercial war in dyes and fertilizer. Long before August, 1914, Summers knew what a terrible part high explosives would play in the war that as early as 1911 he had warned his clients was coming.

More than any other man in America he knew the relations of industrial synthetic chemistry to warfare. Moreover, for the first three years of the war he was identified with the material reinforcement of the Allies in America and from their procurement officers had learned all that was known to them, as the war progressed, of guns and explosives. He had been in daily touch for three years with the manufacturers who were striving to meet the Allies' requirements for

munitions. He knew what had been learned by Americans in that period and he personally knew the men who knew.

Summers had watched artillery development for years; saw the Bulgarians hammer the Turks to shreds with their French guns against the Krupps of the Turks, and knew that the Germans were planning an extensive artillery recrudescence. All the lore of the chemistry ballistics and dynamics of war was at his finger-tips and he saw deeply into the remote economic and industrial implications. Called into consultation with British artillery officers in 1915, General Pease, sometime commandant of the Woolwich Arsenal, casually asked Summers what artillery regiment he had served with when in the army.

All through our participation in the war, Summers was in touch with every phase of artillery development, keeping a particular eye on the incomparable French artillerists. He was as enthusiastic as a boy with his first gun when the French sprang a "75" *coup* in 1918 that appears never to have been made public. They had found that merely by altering the shape of the shell, without changing the gun, the range could be increased from eight thousand to eleven thousand yards. While most of their plants went on with the former type of shell, they concentrated a number of their best plants on the new type and secretly transported immense numbers of them to the front. On a fixed date the 75's all along the French front opened up with the new ammunition and the Germans found supposedly safe positions well within the range of the redoubtable 75's.

Summers was the War Industries Board's alchemist of the wizardry of war. In him Baruch found a man who knew it all or knew where to get what he did not know. As the former glimpsed from the latter the dependence of modern war on applied chemistry and visioned victory in materials, as the two strolled in the woods on Baruch's South Carolina estate, talking of the struggle that was over there and was coming to America, Baruch offered the chemical engineer, out of his own pocket, the same salary he was then receiving to come with him into the Advisory Commission.

"How much do you get?" asked Summers.

"Nothing — and pay my own expenses."

"I'll go with you on the same terms," decided Summers. And he was not a rich man.

Summers and other men who, like him, had been in the war for three years, constituted a group of experts of whom the War Department was ignorant. On this group the Raw Materials Division of the Advisory Commission drew freely and with unerring judgment.

It was Summers who first laid stress on the need of an adequate supply of nitrates, platinum, aluminum, toluol, and many other things. At that time the Ordnance Department was not even interested in toluol and could not be interested, but Summers, Baruch backing him up, later arranged, without any authority whatever, and independently of the army and navy, to have the Du Ponts begin at once to assemble a supply of toluol, as the Allies then had control of virtually the entire production of that chemical in the United States. Yet toluol meant T.N.T., the greatest of high explosives, with which the Germans well-nigh battered their way to victory before the Allies could reply in kind. Thanks to Summers, when the army found out that it would require immense quantities of T.N.T., the toluol was available. There was so little understanding of the material corollaries of war by the army as late as December, 1916, that Summers informed Baruch that it was a waste of time even to propose preparatory technical measures until our own entrance into the war should be imminent. In March, 1917, Baruch declared the time had come, and Summers then took up the work which he did not relinquish until after the war was over.

Hugh Frayne, the labor member of the War Industries Board, carried into that body the important factor of labor representation which had been an outstanding feature of the Council of National Defense, of the Advisory Commission of which Samuel Gompers, president of the American Federation of Labor, was an efficient and tireless member. In passing, it should be said that, while Mr. Gompers was always on guard to see that the war enterprise did not become a means of oppressing labor, he was second to none in the breadth of his patriotic devotion and thought. He was never a class-champion obstructionist in the councils of the Advisory Commission. He was a strong believer in the scheme

of close coöperation with industry and was one of the first to endorse the programme of industrial group committees to facilitate Government dealings with private business. Somewhat inclined to consider favorably the exception of skilled labor from military service, he was an early and whole-souled convert to the principle of selective service. It will do no harm at this late date to say that, when the question of recommending to the President the principle of universal service came before the Advisory Commission, Mr. Gompers frankly told his associates that, while he personally favored it, he considered that it would be inexpedient for him to vote for it. The result was that no vote was taken, but the Secretary of War was authorized to interpret the Commission's views to the President.

With Mr. Gompers on the Advisory Commission and Mr. Frayne on the War Industries Board, there were no dealings with "big business" or any other kind of business in which labor was not consulted and represented. Labor was thus on the inside of the Government's economic policy, and the business of war was not conducted with an eye single to inanimate things and to the neglect of the human element. Frayne knew labor's point of view and how to manage it. He understood the human factor in production. In consequence the War Industries Board took no measures in which the labor factor was overlooked. If prices were fixed at levels which yielded profits that would stimulate production, it was always provided that labor should have a share. It is true that the War Labor Administration was placed in the Department of Labor and not in the War Industries Board, but Frayne played an indispensable part, for he was on the spot, at the beginning of things, shaping economic policies so that labor problems as to supply and remuneration might be so founded that there would be a minimum later need of governmental adjustment. Thanks to his work the corrective functions of the War Labor Administration were not generally required.

Like Gompers, Frayne was for labor, but in the war he was for the country first and for groups second. He was a conciliator and moderator rather than a protagonist. At the same time Frayne was no colorless labor mugwump.



LELAND L. SUMMERS

Technical Advisor to the War Industries Board and Chairman of the Foreign Mission

He was of the heart of organized labor, and was in a sense elected to, rather than selected for, his position.

As the representative of the navy on the War Industries Board, Admiral Fletcher was most successful. He is a man of few words, a good listener and a good "understander." His great value to the War Industries Board was that he was able to rise above his profession and take the broader view. He did not conceive that his duty was to be the protagonist of the navy, but rather to make it a part of an harmonious whole. Through him it was often possible to secure the coöperation of the navy in the general scheme against the opposition of officers who felt that the navy was always competent to pass judgment on all that concerned it without outside suggestion or assistance.

General Hugh S. Johnson was the active representative of the War Department on the War Industries Board, though General Goethals held the title. He was in full sympathy with the purposes of the Board and considered it indispensable. His mind is as clear as a crystal and as orderly as an alphabetical file. It is logic energized. Before its faculty of analysis, the most chaotic disorderliness dissolved into order. His inevitable logic not only clarified the business of the War Department with industry, and cleanly articulated the procurement agencies of the army to the War Industries Board, but even interpreted the latter to itself. It was Johnson, by the way, who, while attached to General Crowder, took it upon himself to have the draft regulations printed and in hand before the War Congress authorized the action or the expenditure. That expresses Johnson.

CHAPTER V

THE SOURCE OF POWER

From the acorn the oak—Administration by request—The right to commandeer—Coöperation the supreme power—Discipline through public opinion—Baruch and Wilson—Baruch in the saddle—Tying-in the executive agencies for a common will to war.

THE records of Congress will be searched in vain for the organic act of the War Industries Board. There is none. The most powerful executive agency for correlating civil and military life in the greatest of wars has no legislative inception. It grew from small beginnings, and, just as its functional branches penetrated and entwined the whole structure of administration affected by war, its roots and radicles of power tapped virtually every permanent or emergency executive power and the unwritten will of the people. Its authority, being without the implied limitations of legislative definition, was, under the stress of necessity, an ever-growing thing which it was difficult to resist. While none could point to any precise definition of its powers by act of Congress, it was equally true that nobody could confidently assert that it was without authority to do what it undertook to do. But because the War Industries Board could not point to any specific act of Congress, it must not be supposed that it was an extra-legal body or that in its mature form it did not have ample authority.

On the other hand, because it began with no executive authority and had to proceed by permission in its early days, it built up a certain authority that was based on the "consent of the governed," and, in general, until the end of its days, acted on the assumption that what it did was willed by those affected. Its government was by request rather than by mandate. It is true that few chose to resist those requests, but compliance was based as much upon the compulsion of reasonableness and the pressure of opinion as upon fear of governmental power.

The powers of the War Industries Board, which, by a

system of interlocking functions that attached to themselves the powers of all executive instrumentalities, eventually became coincident with Government itself, can be traced to three general sources:

- I. Certain acts of Congress relating to preparedness for or the conducting of the war.
- II. Ordinary Executive authority and the extraordinary powers entrusted by Congress to the Presidency for the war emergency.
- III. The formulated and implied war powers of the Executive.
- IV. The consent and coöperation of industry and of the public.

The first included the act creating the Council of National Defense (the Military Appropriations Act of 1916) and the National Defense Act of the same year. The former act, while it related only to advisory right, nevertheless contained ample authority for the original creation of such a body as the War Industries Board, as the act gave the Council authority to "organize subordinate bodies for its assistance in special investigations." Section 120 of the National Defense Act also gave the President discretionary authority to appoint "a board on mobilization of industries essential for military preparedness, non-partisan in character." As mentioned elsewhere, this section, so far as the writer knows, was not specifically referred to by the Council, the Board, or the President at any time, and it is to be noted that no power of executive action was conferred on this possible body. As a part of the Council of National Defense organization the War Industries Board could legally perform any of the functions assigned to it by the latter. In an advisory way these covered an extensive field, as an examination of the act, elsewhere printed in this volume, will show. It is true that the Council was to make recommendations only to the President and heads of Executive departments, but by general consent in practice, after the war began, the Advisory Commission and its creatures communicated directly with subordinate officials of the Executive departments, so that they had a certain degree of influence on the active functionaries.

The acceptance of such advice by the Executive depart-

ments tended to identify the originally powerless adviser with the powerfully advised and gave the former access to the latter's authority. Thus, if the army, the navy, the Shipping Board, or any other Executive body was moved to action by advice coming from the Council, it would follow that it would use all its authority to effect such action. So, in an indirect manner and all too weakly, until injected with directly delegated presidential power, the War Industries Board was in a position to invoke the authority of virtually all acts of Congress conferring war powers that in any way related to its field. It could not wield these powers itself, but it could in a measure cause them to be wielded.

The National Defense Act gave to the War Department (Section 120) the right to supplement the customary awarding of contracts for supplies by competitive bids with direct orders which were in the nature of a command. Refusal to give such orders precedence over all other business was put under penalty of seizure of the plant, and compensation was left to later determination with the proviso that it should be fair and just.

The Naval Emergency Fund Act authorized the navy to requisition raw materials for the navy and for aircraft uses for the army also.

By virtue of the Emergency Shipping Act the President could requisition material needed in shipbuilding.

The Lever Act relating to food and fuel control granted requisitory powers over foods, fuels, and other supplies necessary to the maintenance of the army and navy or any other purpose related to national defense and over storage and production facilities and plants, including coal mines and distributing plants and over coke and distilled spirits. The Lever Act also conferred special powers of regulation, license, and price-fixing.

The Transportation Priority Act of August 19, 1917, was of great importance until the Government took over the railways and could then allocate transportation as it pleased. The control of the railways by the Government gave the War Industries Board, by reason of the unfailing coöperation it always received from the Railroad Administration, a strangle-hold on recalcitrant industries which might be

minded to question its authority. The same was true of the Fuel Administration. When finally clothed in the presidential authority that flowed from these conditions, the Board had implements with which to move almost any obstacle in its path. The Espionage and Trading-with-the-Enemy Acts also contributed important powers.

All of these powers were subject to a varying degree of use prior to the separation of the War Industries Board from its advisory parentage, but that separation, reinforced by the comprehensive powers conferred upon the President by the Overman Act, which authorized him to use the whole body of the Executive power without regard to previous statutes establishing fixed agencies and processes of administrative action, made it possible for him to give the War Industries Board, specifically or generally, all the "teeth" it needed.

Besides definite grants of emergency powers to the President, Congress, in declaring war on Germany, had pledged him the support of all the resources of the Nation. This may have amounted in reality to nothing more than a grandiloquent expression of a good intention, but in a time when men were not disposed to split hairs it was possible to load it with meaning. As commander-in-chief of the army and navy, the President has directly and morally almost unlimited implied powers in time of war in all matters that relate to the attainment of war purposes. Aside from legal powers, actual or implied, that flowed to the War Industries Board from the presidential fount of authority, there were the commercial influence and compulsion arising from the fact that the Government was in the market as the greatest buyer of all times — and in many lines the sole buyer. The seller — the producer — is likely to be amenable to reason under such conditions.

Beyond laws and trade advantages, the War Industries Board had a power that, when stiffened by them, was the greatest of all powers — the patriotic coöperation of manufacturers, merchants, and the public. This power, sedulously fostered when the War Industries Board was legally powerless, supported it magnificently when it came to hold the whiphand — so fully, indeed, that there was rarely any need

for coercion. It carried the spirit of democracy into an autocratic emergency. It resulted in a voluntary obedience to the will of the Board in a spirit of partnership that effected results that could never have been attained by the whip of authority and the spur of penalty. The free-will and devoted outpouring of energy in a common cause is as superior to conscripted energy as free labor is to slave labor. It is one of the greatest, if not the greatest, and certainly the most characteristic of achievements of the War Industries Board that it maintained throughout both a democratic spirit and practice of partnership with the people.

Industry, under this benign stimulus, strove not under abhorrent compulsion or only for pecuniary profit, but also strove for its own greater self — the Nation. Through the commodity sections on the side of Government and the war service committees on the side of business, all industry was merged in the War Industries Board. Subject to the veto of the chairman of the Board, as the supreme interpreter of the national good, industry imposed its own emergency laws and regulations and assumed nine tenths of the burden and responsibility of enforcing them. Subjected to the test of patriotic service, the most sordid business men, even the branded ghouls of the under-world of business, did their duty rather than face the contempt of the trade. They conformed, it is true, to be in the fashion; but even so, they enjoyed an inspiration that would have been lacking under the prod of a bayonet.

Of course, disciplinary measures were sometimes necessary, but the War Industries Board never used its legal power in such a way as to destroy its moral power. When it did apply punitive measures, they were welcomed by the majority of the business community, were salutary in their effect on the minority, and without reactive vindictiveness on the part of the culprit. Almost without exception the announcement of an intention to resort to stern measures was sufficient, not only for the individual case, but for its class. For such an expression of intention led to a revelation of unsuspected powers in a body that had none in the beginning, but had drawn to itself all those of a determined nation grimly at war.

On one occasion a great automobile manufacturer, who was undoubtedly of the opinion that in restricting the automotive industry the Board was acting arbitrarily and not in the true public interest, refused to comply with the "request" for limitation of production. Having ample supplies of coal and raw materials on hand, he felt that he was independent and could do about as he pleased. He flatly refused to comply with the request. The chairman called in a naval officer on duty with the Board, and asked him to see that the manufacturer's stores of coal were commandeered.

"You wouldn't do that, would you?" asked the amazed automobile man.

"So far as I am concerned," was the answer, "it is already done. So far as you are concerned, it will be accomplished to-morrow morning."

That was enough.

On another occasion a dissenting lumber manufacturer defied the chairman even to the extent of challenging him to commandeer his mills, saying that he, the chairman, knew perfectly well that the Government could not conduct them efficiently.

"Quite true," responded the chairman, "but by the time we commandeer those mills you will be such an object of contempt and scorn in your home town that you will not dare to show your face there. If you should, your fellow citizens would call you a slacker, the boys would hoot at you, and the draft men would likely run you out of town."

That, too, was enough.

While it was not necessary for the War Industries Board to draw its gun very often, the fact that it had a high-powered one in its holster was of immense value in invigorating its administration, after many months of more or less ineffectual attempts to borrow powers that it had no right to command. When the new chairman — with new powers — came in, in March, 1918, the executives of the Board, almost to a man, inquired what authority they had to make the discharge of their functions effective.

"All that I myself have," was the answer, "and if that isn't enough, I'll get more."

The possession of power and courage to use it usually pre-

clude the invocation of its ultimate implications. Fear and timidity fathered more procrastination and indecision in governmental departments during the war than did the lack of power. But when courage and ample power came together, the impossible became possible. That happened when the third chairman of the War Industries Board took office.

It is a singular fact that the Overman Act did not mention the War Industries Board, the strengthening of which was its chief object. The status of the Aircraft Production Board had theretofore been much the same as that of the War Industries Board, but the Overman Act specifically gave the President authority to make it an independent administrative agency. The much more important War Industries Board was not even referred to indirectly. It seems to be a fair inference that, in consequence of the bitter criticism that had been discharged at the Government because of its desultory method of dealing with war supplies, the President did not care to advertise that, in his own way, he was attaining the thing he had been condemned for not doing directly.

The power finally vested in the War Industries Board and the scope of applicability of that power were so great that there is danger that they may be thought to be greater than they were. It became the general manager of American industry whether engaged in production for civil or military purposes. That is so stupendous a thing that the mere statement of it in unpretentious language is weak. Not only did it have the office, but it filled it. Directly or indirectly all industry and commerce existed but for war purposes, and the War Industries Board saw to it that they were held to the objective. Great as it was, however, it served, but did not direct, the making of war. It did not pretend to judgment or criticism in military matters, and Mr. Baruch always sought to keep safely on his side of the line of demarcation. It was for the army to say, for example, how many big guns it needed and of what type. The War Industries Board had nothing to say about that. If a new plant were needed for their manufacture, it was for the army to determine its size and cost. The War Industries Board did not even attempt to say where it should be established. It was not for the War Industries Board to say how many men should be sent to

France, but it was its business to see that production and distribution were shaped to their maintenance when once it had learned what the requirements were. In a word, with the determination of military policies and munitions, the War Industries Board had nothing to do. It was charged with meeting the eventuating requirements in goods.

Before its final reorganization, the Board had nothing to do with the relations between the War Department or the navy and a contracting plant. It could not intervene to cut red tape, perfect organization, or stimulate production and hasten delivery. After March 4, 1918, however, and particularly after the reorganization then begun had the ratifying sanction of the Overman Act (approved May 20, 1918), the War Industries Board became a sort of inspector-general of the other war agencies, and as such was more or less resented. While the remarkable letter (which, by the way, will repay the closest scrutiny) of the President to Mr. Baruch, authorizing the new régime, directed the latter to leave alone what was being well done, it also directed him personally "to guide and assist wherever the need for guide or assistance may be revealed," and in brief to "*act as the general eye of all supply departments, in the field of industry.*"

These were such far-reaching powers that it is certain that had the war gone on Mr. Baruch would have been the virtual head of all the supply departments of the Government relating to the war enterprise. Once the purely military decisions were made and the contracts placed through the legally designated agencies, it would have devolved upon Baruch to see that they were expeditiously complied with. That function would have led inevitably to some modification of military determinations in so far as they involved incompatibility with available resources and facilities. As a matter of fact, Baruch did begin almost immediately to take a hand in artillery production, but as the War Department had then established a Director of Munitions for the purpose of centralizing and ordering the direction of production, the matter was allowed to drift for some months. Just before the armistice, however, Baruch was again directing his attention to this matter, for it was admitted that progress in the produc-

tion of artillery was most unsatisfactory. Similar exercise of the "guide and assist" functions in other directions was rapidly making the chairman of the War Industries Board the head center of production in all its phases.

Being an individual rather than a committee, the chairman could decide quickly and act promptly. Realizing that his powers either in origin or in adaptation proceeded from the President, he kept in close touch with Mr. Wilson, usually asking the President's sanction in some form for each new acquisition of applied power within the general boundaries of his sphere. For example, as the test of whether there was a shortage of a given material revealed additional extensions of control, the chairman, in writing to the President for a grant of funds to provide quarters for an increased staff, was able to say with truth: "*Since you recently granted me the power to take over or control the steel, woolen, lumber, and rubber industries, the War Industries Board is in practical control of the whole field of industry in this country.*"¹

The correspondence between the "industrial dictator" and the President reveals an unfailing promptness on the part of the President to concur in every undertaking of the former and an unexpected closeness of the President to all the supply problems. In passing, the writer is prompted to say that, in the course of the preparation of this book, he has interviewed some twoscore of the executives of the War Industries Board and the Council of National Defense, and that all of them, regardless of party affiliation, who had any personal contact with President Wilson, united in expressing appreciation of his quick grasp of the fundamentals of the most abstruse and technical industrial problems that were laid before him. It is possibly true that the President did too long defer a determination of the problem of industrial centralization for war purposes; but, on the other hand, once he had decided his course and mapped it in the lucid and comprehensive letter of authority to Mr. Baruch, the supporting decisions were always prompt and clear-cut.

It would be tedious to follow the whole process of actual occupation of the field laid out by that letter, but one or two

¹Italics are the author's.

points are of special interest. After the Overman Act was approved, the President transmitted to all departments and agencies concerned copies of his Executive order, formally confirming his anticipatory action, in order that there might be no misunderstanding of the important fact that the War Industries Board had become "a separate administrative agency to act for me and under my direction," with "functions, duties, and powers . . . as outlined in my letter of March 4, 1918, to Bernard M. Baruch, Esquire."

On September 3d, the President took a step that really transferred to the chairman of the War Industries Board sole authority over the chief disciplinary and punitive power of war-time regulation of industry, namely, the commandeering power. On that day he wrote to all the heads of interested Executive agencies a "request" that the "commandeering power should not hereafter be exercised over any of the agencies of the country without first consulting the chairman of the War Industries Board." This put an end to indiscriminate commandeering for particular purposes of materials that were in general demand and should have been rationed and allocated, and at the same time gave to the chairman a sharp sword of force to supplement the scepter of authority. It was also, in effect, a gentle reminder to all Executive departments that the authority conveyed to the War Industries Board and to its chairman in the letter of March 4th was very real and affected them all. It was a far cry from the former days when the War Industries Board functioned only by invitation and tolerance through advice that was often never sought and as frequently ignored.

The abuses of the uncoördinated commandeering power had been appalling. The railways were paralyzed by the commandeering of transportation in the form of "expedited shipments" by agents of the army, navy, Shipping Board, and what not — all of them insisting on preferential treatment, until there was nothing that was not preferred. It was this every-man-for-himself priority that was attributed to Judge Lovett, whereas he had nothing to do with it. The War Department got its first hard bump in its career of ruthless commandeering when it commandeered the Southern Pacific coast-line ships between New York and New Orleans

and Galveston, just after McAdoo had become Director of the Railroads. He directed that the commandeering order be disregarded and announced that the ships were under the jurisdiction of the Treasury Department. In the flush days of rampant commandeering the departments even gayly commandeered each other's goods.

It would be painting altogether too rosy a picture to say that when the armistice came the War Industries Board had every power that it should have had, especially over other agencies of the Government, and that under its control the whole complex and intricate war plant was functioning as smoothly and coördinately as the Board was functioning internally. It was no easy matter to harness the many executive agencies, long accustomed to going their own way. To have attempted it quickly and violently might have resulted in more friction than progress, but the War Industries Board was clearly far advanced on the road to such a position of control of the industrial forces as the Secretary of War and the Secretary of the Navy had over the military forces. On the one hand, the President had the army and navy, on the other, the War Industries Board; the former to wield the mailed arms of the Nation; the latter to mass and mobilize the material power of the Nation for their unfailing support and its own conservation.

NOTE

A good conception of the Board's far-reaching powers can be gained by a perusal of the outline of its purposes and functions, which was issued by the chairman as a guide to his personnel and for the information of industry. A copy of it follows:

Wars are fought and won—or lost—on the land, on the water, in the air, and on those battle lines behind the front where the civilian forces stand.

It is not enough to mobilize the Nation's military strength. There must be a mobilization of her full economic resources—industrial, agricultural, and financial. These must be organized, coördinated, and directed with the same strategy that governs the operations of the purely military arms of service.

The prodigious strain upon the world's productive capacity must be met and balanced to provide the means of warfare and to maintain the civilian population as well as to preserve the economic fabric.

America to-day is the chief source of strength to the forces engaged in the

conflict against German world domination. That strength is expressed in terms of man power and material—the one military, and the second industrial.

To control and regulate industry in all its direct and indirect relations to the war and to the Nation, the President has created the War Industries Board and placed the responsibility for its operation in the hands of the chairman. The letter of March 4, 1918, delegating Executive powers, follows.

The War Industries Board is charged with the duty of procuring an adequate flow of materials for the two great war-making agencies of the Government—the War and Navy Departments—and for the two agencies in immediate affiliation with these military arms—the Emergency Fleet Corporation and the Railroad Administration.

Also, the Board provides supplies necessary to the military needs of our associates in the war, and those commodities required by neutrals in exchange for materials essential to us.

Finally, and of paramount importance, the Board, in alliance with the Food, Fuel, and Labor Administrations, provides for the country's civilian needs, the protection of which is a particular duty of the organization.

It is not only the duty of the War Industries Board to stimulate and expand production in those industries making war essentials; it is equally the Board's duty to protect, as far as may be, those industries not immediately essential to the war programme.

It is the policy of the Board, where retrenchment and curtailment are necessary, to keep alive, even though it be necessary to skeletonize, the enterprises in this group, and not to destroy them.

Whenever possible, conversion of industries from a non-war production to an essential output is effected.

The War Industries Board is a method of control devised by the President to equalize the strain placed upon the American industrial structure by the war.

It stimulates and expands the production of those materials essential to the war programme and at the same time it depresses and curtails the production of those things not of a necessitous nature. This is done by regulation, in consonance with other Executive branches, of the basic economic elements: (a) facilities, (b) materials, (c) fuel, (d) transportation, (e) labor, and (f) capital.

The method of control is through a preference list, on which are placed those industries whose output is essential to the war's progress. The priority indicated by the preference list is the master key to the six elements named.

Further, the Board regulates all and controls certain other industries of first-rate war importance, it fixes prices through the price-fixing committee, it creates new and converts old facilities, it clears the national business requirements, and it leads to conservation, which is needed to bridge the gap between the extraordinary demand and the available supply—a gap which exists in almost all the great commercial staples.

The War Industries Board embraces all and each of the Nation. Food and fuel are separately administered, but with every other article of military need and of ordinary life the Board has a direct connection, and it has a basic relationship with food and fuel, too, for both require in production and distribution the materials that the War Industries Board provides. Its strength lies in the full and patriotic coöperation that American business, including both the employers and the employees, gives in working out the problems common to us all.

The abnormal conditions of the war demand sacrifices. It is the price of victory.

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Only actual needs, not fancied wants, should and can be satisfied.

To save heavy and long privation, temporary deprivation must be the rule.

America's willingness to accept these conditions marks her ability to quicken the end of the conflict.

CHAPTER VI

THE DRAMA OF REQUIREMENTS AND RESOURCES

I. GENERAL CONSIDERATIONS AND "CLEARANCE"

War on the modern scale — America asleep — The awakening — The cry of the Allies — Doing the impossible — Chaos in the War Department — Harnessing the flood of orders — Clearance and its workings.

ONLY a state shaped and organized for war can approximate the material requirements of modern warfare and meet them by the simple procedure of honoring a predetermined draft on its resources.

Germany was the first of the nations to plan war on a scale corresponding to the exertion of the maximum physical force of the nation, which involves the orderly concentration on the war objective of the entire man power and material resources of the nation. France crumbled in 1871 before the hammer blows of a yet incomplete application of this conception of the entire energies of the State directed to war. Between 1871 and 1914, Germany had carried the conception of the State as primarily a unified war-making agency to the highest possible degree short of the improvements that might be made in the light of experience that could come only from the actual test of the first grapple of peoples.

Before Germany led the way, no modern nation had ever thought of war as the application of every ounce of its potential strength. Hitherto wars between civilized nations had been more in the nature of limited international duels than rough-and-tumble struggles to the death. The nations had their standing armies and navies of a size that would not unduly strain the resources of states primarily devoted to the cultivation of peaceful pursuits. In time of war these were somewhat augmented, but never in a volume corresponding to the utmost capacity of the nation. The issue was then left to these fighting agencies, and there was no thought of exhausting the nation in supporting them beyond a certain varying but never all-embracing draft on national resources.

The armed forces lost or won their battles in the course of a year or several years during which the internal life of the nation went on pretty much as in time of peace. When the prescribed means of offense or defense were exhausted on one side or on both, the nations made peace, accepting the test of a limited wager of battle rather than putting all in the balance.

Germany's example, of using peace as a period in which to prepare for war rather than as an end in itself, forced other Continental nations to follow suit, but none of them did so with German thoroughness. Britain was prepared upon the sea, but for her that did not involve a shadow of the universality of the German plan. But of all the great nations that were drawn into the furnace of the universal conflict, the United States was the most remote in practice and understanding from the modern sort of war.

Germany was simply all army — all fighting men or supply organization. All its manhood was in the army — active or reserve; all its commerce and industry were organized and directed to function as parts of the fighting nation. When war came, it was only necessary for the Government to make conversions and adaptations that had long been planned in the greatest detail in the presence of a complete knowledge of resources and facilities. That the event demanded more than had been foreseen, and that the machine broke down in some respects, is beside the question. Germany knew that a certain number of millions of men in arms could be transported to the seat of war in a certain time, and that facilities for supplying them were ready and sufficient for that certain length of time that would be required to achieve victory. She dealt, therefore, with definite requirements to be met from exactly known resources and by adequately provided facilities. Germany prepared for the expected and later improvised for the unexpected: we improvised for the expected and later prepared for the unexpected.

With us every factor in the war problem was an unknown quantity. We did not have our resources and facilities catalogued and correlated. In terms of war we did not even know what they were. We did not know how large an army the necessities of the Allies would require from us, and we

did not know the capacity of the "ocean conduit" from America to France for men, equipment, and supplies. Ship tonnage was manifestly the measure of our effective participation in the war whether as an active combatant or as the steward of the battle line. We did not know what the limitations of tonnage were when we entered the war, and we did not know what they were at the end of the war.

Moreover, though we knew neither our own requirements nor resources, and though the former came to exceed the wildest guess of the early days of the war, we had also to deal with certain requirements of the Allies which varied and expanded. At first, it was assumed, not only by ourselves, but by our Allies, that our decisive contribution to the war would be one of supplies and *matériel*. When Marshal Joffre came to the United States in June, 1917, he talked about one division of troops at once, as a convincing symbol of alliance, and "perhaps" 400,000 or 500,000 soldiers in France at the most. One year later the most unmilitary of the great nations had 2,000,000 soldiers in France and more than 3,600,000 actually under arms; was preparing to put and maintain 5,000,000 men in France and conduct the war single-handed against Germany, three thousand miles distant, if both France and England should be prostrated.

Under such circumstances there was no such thing as a logistically balanced war scheme. We never did know our requirements either potentially or as measured by the capacity of ocean transport. All we know now is that the requirements always got larger, always overran the shipping capacity, and yet that the latter grew so amazingly under stress that we could never say for certain how great it might be on the critical morrow.

The situation was bewildering and chaotic, and while preorganization would have led to systematic and much earlier adaptation to the demands of the unknown, it could not have made it knowable. The army and navy, stumbling forward into the unknown wilderness of war's tangled demands, were criticized by critics who were still more ignorant of the vast variants of the problem. On the same editorial page one could read frantic demands for an expansion of the army beyond the published plans, and convincing calculations that

shipping could not be supplied for even a moderate army. In the late fall of 1917 and the early winter of 1918, when it had become understood by the Allies and ourselves that the winning of the war would necessitate an American army of millions in France instead of hundreds of thousands, the War Department was stupefied by the status of transport.

"To equip and maintain even the disappointingly small army which our available troopships could put in France by the summer of 1918," says a then "secret" statistical report to the General Staff, "would require double the cargo capacity and three times the animal transport now available." It seemed impossible then, because of lack of ships, to put more than 500,000 men in France by July, and quite impossible, for the same reason, to maintain that many once they were there. France was declaring that its army would be paralyzed unless we could provide 400,000 tons of shipping in addition to what we were then giving; Italy saw only defeat unless we could give her 1,250,000 tons. The navy demanded 350,000 tons. Including troopships, cargo ships, tankers — everything in and out of Government service — there were then only 4,000,000 tons in sight.

It seemed certain that the war would be lost in "the neck of the bottle." Yet within four months the sturdy divisions of the last reserves of fighting manhood of the white races were pouring through the same neck, monstrously enlarged, at the rate of 225,000 men a month and with an equipment of weapons and supplies, outside of artillery and projectiles, never surpassed or even equaled by much smaller armies so far from the home base.

Great Britain, mistress of the seas, had thought it a colossal enterprise to put 250,000 men into South Africa in the course of the Boer War. We put more than that in France in a single month, supplied them liberally, and at the same time poured out in unstinted quantities the food, fuel, materials, and munitions that kept the Allied armies going. And yet, in the welter and rush of the intense and triumphant struggle, the failures and disappointments loomed so large that many a commentator achieved passing vogue as a prophet by branding the struggle as doomed.

Under such conditions the task of mobilizing and directing

industry for war purposes became one of gigantic improvisation. When Pelion is piled on Ossa again and again, there is no measuring of requirements. The industrial army of America could only be driven at higher and higher speed as requirements vaulted and ships multiplied; and be switched round and round as demands rose and fell and changed in nature. To an unknown demand there was nothing to do but to oppose an unknown effort. "It can't be done — but here it is" became the cool word of the hour.

Our small army was of the old type — separate from the Nation and in no way integrated with it. In consequence our so-called General Staff was a purely military group; not a Great General Staff. It had made no study, and, as a body, had no comprehension, of the fact that in modern war the whole industrial activity of the Nation becomes the commissariat of the army. It had no affiliations with the complex and fecund industrial life of the Nation. It understood nothing of the intertwining ramifications of production. It knew nothing of the economic sequences of new demands, so vast as to exceed existing supplies. Its sole experience in business was the placing of orders for comparatively small quantities of goods in a market so well stocked and so voluminously supplied that they had no appreciable effect on reserves or prices. In the army alone there were at first five and later eight departments exercising the purchasing function, and altogether there were twenty-two spigots for the diffusion of emergency funds. Bound by inflexible statutes, supported by long usage, they operated independently of each other even within the army and yet bought, in some instances, the same classes of supplies.

At the same time none of them had any adequate knowledge of the immediate or remote productive capacity of the country in any line. Some of these departments not only bought for themselves, but for other departments. There was no central purchasing agency or even a central clearing office. The Signal Corps, for example, purchased certain kinds of blankets, horse equipment, and vehicles. The Medical Corps bought beds and blankets and certain personal equipment, not only for itself, but for troops of the line. The Ordnance Department, outside of purchases for its own

proper uses, bought horse blankets for the cavalry, but not the blankets for the soldier's bed. What the other departments did not buy for themselves or for each other the Quartermaster's Department bought for all.

Though the same department was nominally in charge of transportation, each bureau had its own system of transportation and storage all the way from first sources to ultimate distribution; and regardless of the needs of other departments each bureau "maintained its own system of warehouses and distribution from the hintermost interior to the very battle line, and the barriers between the quintuplicate system of purchase, production, inspection, storage, and distribution were almost impregnable." Each of the supply agencies had a different coefficient of unitary demands, with the result that for an army of a given size one would demand supplies out of all proportion to what the others would hold sufficient. Each placed its orders virtually without consulting the others. There was neither centralized knowledge of requirements nor groupings of purchases according to commodities.

The result in the World War was, of course, disastrous competitive buying, conflict of orders, congestion of purchases, waste of transportation. To make matters worse, there was no well-thought-out plan for the supply, say, of an army of a million men or, in fact, for an army of any size beyond that then in existence. So, these multiplex and conflicting agencies did not even have a general scheme to work to. If they had had one, they were not adapted to harmonious coöperation, and, finally, their groupings of required supplies did not correspond to industrial groupings. They did not buy by commodities, but by technical military uses of commodities. It was difficult, therefore, to interpret military requirements even when determined in military phraseology into the language of business. Consequently, there was no means of close articulation with industry, which is not divided into groups for the production of engineer supplies, quartermaster supplies, medical supplies, etc., but for the production of commodities which may fall into any or all of the military classifications.

Now, add to the archaic army supply system, which was

a house divided against itself, the demands of the navy, of the Red Cross, of the Shipping Board, of the Housing Corporation, of the Railroad Administration, of the Public Health Service, of the Food Administration, of the Allies, and various other emergency requirements — all with pléthoric purses, all with a common conviction that they needed immediately more than they could possibly get. Then turn them loose to buy goods of literally more than one hundred thousand different sorts — many of them of novel design and material — in a market that was already overburdened because of domestic prosperity and booming foreign trade growing out of the war, and you cannot fail to have stupendous confusion, congestion, and sky-rocketing prices. Each order, when split into commodities, and the commodities into terms of raw materials and facilities of manufacture, ran into multitudinous feeders and concentrated unheard-of, uncalculated, and incalculable demands upon remote and unconsidered sources that were of infinitely small capacity compared with the demand. At the beginning of the war the Government knew nothing of procuring supplies beyond giving orders. Notwithstanding the red tape of the ordering instrumentalities, they soon developed vast energies with which to dispense the billions that were placed at their disposal.

Our machinery for determining requirements was, of course, the worst imaginable; but even if it had been perfected long before the war, it could never have produced a reliable bill of requirements, because the volume and the nature of the requirements was changing from day to day and was unforeseeable, hardly even guessable. It would have needed such an intimate and compelling association with science and industry and such a deep comprehension of economic inter-relations as is scarcely conceivable under our form of government, in order to put out an estimate of requirements that could be relied upon. Even the making of intelligent requirement estimates — to say nothing of meeting them — involves a thorough knowledge of resources, for there can be substitutes and revisions of needs as much as of goods.

Had the United States Government maintained only the

statistical organization that the efficient conduct of manufactures, agriculture, and commerce requires, there would have been a solid foothold from which to explore the field of potential resources. The census, taken once in ten years, and the survey of manufacturing industries, taken once in five years, are old and stale before they are published. It became necessary for the War Industries Board to make its own survey of resources before it could intelligently compare them with the war demands. It had inherited the schedules of the Committee on Industrial Preparedness and it was able to draw upon the statistical information of various trade groups; but at first its information was at best fragmentary and it took time to get it into integral and usable form.

However, without a comprehensive knowledge of either requirements or resources, the flood of orders which necessarily converged upon a limited number of final-form producers automatically provided data for a degree of provisional relief from the increasing disorder. It required but a rough knowledge of the current situation to see that certain industrial sections and certain plants and certain portions of the railway systems were or were about to be overwhelmed with immediate orders. If competitive buying among the various departments of the Government could not be eliminated at once, it was at least possible to undertake to stop the flow of buying where the channel was hopelessly clogged and divert it to other channels.

So the first effort of the War Industries Board to inject some kind of order into Government buying was the creation of a clearance agency, which first appeared as the Clearance Committee of the General Munitions Board. It was composed of a chairman, a representative of the navy, a representative of the General Staff of the army and of each of its supply bureaus, of the main divisions of the Board, and of the Shipping Board and the Food Administration; and, later, of a representative of the Allied Purchasing Commission.

Even before a clearance agency was formally established, there was a certain amount of clearing going on in consequence of the summoning of the leaders of industry to

Washington and the forming of the business group committees. This was particularly true of the work of the Raw Materials Committee of the Council.

In response to the pressing need, manufacturers, instead of accepting all the orders that were showered upon them, began to initiate a sort of volunteer clearance. A notable instance of this sort is that of the action of the manufacturers of electric wire and cable. Mr. Le Roy Clark was chairman of their trade committee. Beginning with concerted action in regard to naval requirements four days after war was declared, Mr. Clark soon found himself the clearing-house for virtually all Government orders for electric wire and cable. The facilities of the entire industry were known to him and were at his call. He knew just when, where, and how an order could be met, if at all. In this case clearance began at the beginning and there was no confusion.

It was to the happy thought of the Advisory Commission of the Council of National Defense in establishing liaison between industrial groups and the Government through the Council that such voluntary clearance agencies received an official standing. Bad as the early confusion was, it would have been infinitely worse but for these trade committees — damned as they were by those who were more concerned with impeccable instrumentalities than with results. Later they evolved into the essential implements of the War Industries Board in the performance of its functions, producing on the side of the Government the commodity sections of the Board and on the side of industry representative committees through which the former made their contacts with business.

How natural and informal this birth of clearance was may be gathered from the fact that Mr. Clark never received formal recognition from the Council or War Industries Board until the latter was separated from the Council.

As he was performing a public function, he could not carry on correspondence on the stationery of his company, so he asked Commander John Hancock what standing his committee had.

"I should say," answered the Commander, "that this committee was the Wire and Cable Committee of the

Advisory Commission of the Council of National Defense," and authorized Clark to put it on his letter-heads.

About six months later, after Clark had cleared millions of dollars' worth of business, a member of the director's office sent for him and inquired: "Where did you get the authority to use that letter-head?"

Clark explained, and asked: "What is the trouble?"

"There is no such committee of the Council of National Defense, and some day we are going to get into a Congressional investigation and this thing will look pretty raw," the officer explained.

"If you want us to stop, say so," said Clark.

"Oh! no, for Heaven's sake, no: I will go over and see John Hancock."

When an appeal was made to the Council to legitimize its firstborn clearance child, it was found that the edict had gone forth that there must be no more committees. So Clark's committee never did exist officially, though it had kept its field as clear as a billiard table and handled millions of dollars' worth of Government business without friction, confusion, or delay.

The fact is that the really efficient clearing was always done through the commodity sections and the war service committees of industry. The general clearance committee functioned beneficially for a short time, but soon became hopelessly bogged in a multiplicity of clearance demands. It set up a general clearance list, which was a list of all materials of which there was a shortage. Government supply agencies were requested not to place orders for any of these materials without getting clearance from the committee. This request was obeyed in varying degrees. The committee undertook to pass on applications for clearance of orders with several factors in mind. One was to prevent the placing of orders with plants that were already overwhelmed with business, another was to determine their relative importance with respect to time of delivery, and another was to prevent the causation of abnormal prices.

The method of procedure was for the representative of each purchasing agency to read his proposed orders. If there was no objection, his orders were cleared; if there

was, they were held up until an adjustment could be made by the proper agency. It was soon found, however, that it was physically impossible to give intelligent clearance merely by listening to the tedious reading of hundreds of orders each morning. No member of the committee felt competent to grant or deny clearance to lists thus presented. A few items might stand out as plain, but most of the heterogeneous lists were in obscurity. Shortages developed over pretty much the whole field of supplies, and it would have required encyclopædic knowledge and a phenomenal memory to have checked off free items in the ponderous lists.

As a committee, the clearance committee broke down in trying to pass on the numerous deadlocks that arose, especially when it attempted to exercise that phase of clearance which meant preference or priority, as where two army bureaus insisted on having the right of way. This failure magnified the specialized function of priority, under another committee. And when it was found that the clearance process had little effect on prices, the creation of a price-fixing agency followed.

But clearance was an indispensable service, and when the committee began to degenerate, because of the hopelessness of the task as it came before it, and because purchasing officers had begun to take the short cut to the commodity committees or sections, leaving figureheads to attend the committee meetings, the War Industries Board took the short cut itself. It diverted the clearance function from a general committee to specific committees which eventually became commodity sections or divisions, retaining merely a distributing center under the name of the Clearance Office. To this office came all applications for clearance and by it they were referred to the proper committee or section. Thus, in the later form, fifty-seven units split up the clearance problems among themselves, and each proposed order went to the one that knew all that there was to know that bore on the clearing of that particular order.

Prompt and intelligent action resulted. The Clearance Office became the one place in the Washington complex of war-time where it was possible to find the actual drain on

industry and resources. Here, theoretically, and to an increasing degree, in fact, came all Government requisitions for goods, and here they were compiled into commodity classes. The clearance function, intended to apply, at first, only in case of a shortage of materials, and to equalize the pressure on industry, was eventually extended to all orders intended for placement in the congested district north of the Potomac and east of the Ohio and to all orders that implied the creation of new instrumentalities of production.

In the last stage clearance was a very definite process. An application for leave to purchase might be cleared with comment, cleared with restrictions as to territory in which the order might be placed, with restrictions as to the power or fuel system that might be used, with inhibitions as to certain plants or the creation of new facilities, with actual designation of a particular source of supply or with advice relating thereto.

Frank A. Scott was the first chairman of the clearance committee. He was followed by Lieutenant-Colonel C. C. Bolton; and after the reorganization of the War Industries Board in the spring of 1918 Admiral F. F. Fletcher conducted the Clearance Office. With the emergence of the Requirements Division, the Clearance Office ultimately became a clerical appendage to it.

Clearance was the first implement used by the evolving War Industries Board in dealing with its huge and vague task. It was not a fundamental measure, but it was urgently necessary because the fundamentals, which might have been organized in years preceding the war, could not be encompassed in the war. The fundamental thing would have been a scientific balancing of requirements and resources with an orderly flow of supplies into needs that would have made clearance unnecessary.

Clearance had nothing to do with the basic problems of requirements and resources. It was the agency by which the jam of immediate demands or current orders was cleared up and by which thereafter the day-to-day needs were met in hand-to-mouth fashion. Clearance was not a budget; it was merely a check-book. It was an emergency measure, but it set in train greater things. It became a meeting-

ground of officers and civilian coöperators and a clearing-house of ideas. The civilians in the War Industries Board learned all sides of the army supply problem and the army and navy men had their eyes opened to the intricacies of commerce and industry and to the great importance of civilian assistance. When an overworked army officer discovered, for instance, that he had been buying cement five hundred miles away from the point of its use, when he could have bought it at a mill ten miles away, and that there was a keen business man at his command who knew everything about cement, who could prevent all such errors, he was likely to look with favor on the extension of civilian coöperation. Clearance cleared the way for the civilian management of industry devoted to war.

"The manner in which clearance was handled in the latter months of the war was an inspiration," writes General Hugh S. Johnson. "In a single department 27,371 requests for clearance were handled between July 23 and November 30, 1918; 13,677 within twenty-four hours after receipt, and of 13,694 others ninety-five per cent were cleared within forty-eight hours after receipt."

The clearance system had a very valuable by-product in its effect on current purchases. It brought the various purchasing agents face to face with the realities of the situation. While it did not deal with requirements in the larger sense, it induced a distinction between immediate and ultimate needs that had a profound effect on the equitable distribution of materials. A restraint was placed upon the tendencies of the buying agencies virtually to effect a temporary corner in different materials by buying at once enough to meet programmes of production that might extend over a year or more, thus denying the current needs of other agencies. At the same time clearance contact emphasized the need of forecasting ultimate requirements and massing resources, so that when the time came for deferred purchases the doors to supply would open freely.

Theoretically, the clearance function was achieved in perfection when the War Industries Board finally came into its own. It fell short in practice because it was never possible to send the whole stream of Government orders

through it, and because, when its machinery had been built up and put in running order, it had to deal, not with a clean slate, but with an industrial situation that had already been thrown out of balance. Nevertheless, if the War Industries Board had never performed any function but that of clearance, it would have justified its existence. It turned a wild and frantic stampede of eager buyers and hospitable sellers to get together with a rush, into a rational routine; proportioned orders to productive capacity, eliminated the speculator and the shoestring manufacturer, harnessed demand, and husbanded materials and facilities.

CHAPTER VII

THE DRAMA OF REQUIREMENTS AND RESOURCES

(continued)

II. THE BROADER PHASE

"Business as usual" to the scrap-heap — Taking the long view — "Requirements" a central coördinator — Demanding team-work of the star players — General March and the War Industries Board — Through the neck of the bottle to victory — The stupendous military programme — Baruch and a cablegram from Pershing — The lesson of a disaster averted.

IN those tense and stirring days of the spring and summer of 1918, when the miracle happened and the fresh and rugged divisions of the armed youth of America poured through the Atlantic bridge of ships in hosts that were awesome to the Germans and inspiring to the Allies, the Republic began to see the war in its true perspective.

"Business as usual," once the universally accepted philosophy of the shaking times, which served as a malign anæsthetic for the Nation in the strain of complete reversal of economic life from production for use to production for destruction, had gone its way to the grave of ephemeral and superficial slogans. The whole people now understood that all its business was radically unusual — that nothing could be done that did not contribute directly or indirectly to the winning of the war.

The understanding of modern war was sinking deep. All the people saw that, whether they wished it or not, they had been drafted into a combatant force that was coincident with the whole life of the Nation. A few millions of young men were set apart for the wielding of the weapons and the powers of the Nation, and all the rest of the population was employed in the continental commissariat which forged the weapons and generated the power.

With this understanding of war as the only business of all and a business that might monopolize national energies for years, came the time when the leaders could take the long view and begin to husband and develop resources, to rise

above the absorbing demands of the moment and survey the requirements of years, to pass from preoccupation with industrial tactics to the measured manipulation of industrial strategy. From a frenzy of effort to define and fill immediate demands they passed to a period of cool calculation in which they appraised the facilities and resources of America as the only salvation of the world, and began to utilize them in such ways that the maximum outflow would not exceed the maximum inflow.

They looked upon America as a giant of vast reserve forces, soft and flabby in places, which must be exercised, trained, and recuperated, made and kept fit, shaped to deliver sledgehammer blows day after day without fatigue or exhaustion. They knew that he must not be overstrained to-day lest he become stale on the morrow. They were indifferent to local weaknesses and occasional ineptitudes, provided they could see that from month to month the Colossus became ever stronger and more supple. They sought to regulate his tasks according to his growing strength, but not beyond it.

It is true, as has been said before, that it never was possible to ascertain what the American requirements would be; but the time came when every effort was made to appraise them in the face of a struggle so titanic and erratic that to-day was often no forerunner of to-morrow. It is at this point, too, that we find one of the chief flaws in the War Industries Board organization, which even at the signing of the armistice had not reached the estate for which it was pointed.

The interlocking of the direction of supply with the sources of demand, which may be accepted as a brief denomination of the functions of the War Industries Board, was never so gripping and compelling as it should have been. The gears of demand and supply did not accurately mesh. It is true that, as the War Industries Board evolved, the chief factor of demand — the army — also evolved reciprocally, and the two came more and more to complement each other, but the army had not become fully accustomed to systematic coöperation with its great supporter when the struggle suddenly ended. To the last day the army was

too much absorbed in the tense present to give adequate thought in a harmonizing way to the inevitable morrow. In all fairness, it must be said that, while on the side of the War Industries Board the problem was viewed in its true perspective, it had not yet provided the mechanisms with which to perform its functions to the fullest degree. They were not the sort of mechanisms that could be made as easily as they could be sketched.

The Requirements Division of the War Industries Board was not created until June, 1918. Alexander Legge, general manager (now president) of the International Harvester Company of Chicago, vice-chairman of the War Industries Board, and formerly business manager of the Allied Purchasing Commission, was made chairman of the division, which was designed to be representative of all the buying agencies of the Government. The supply departments of the army and navy had each a common representative, and the General Staff of the former and the latter as a unit were also separately represented. There were besides representatives of the Emergency Fleet Corporation (Shipping Board), of the Allied Purchasing Commission, of the Red Cross, of the Railroad Administration, of the Food Administration, and of the Marine Corps. The War Industries Board was represented by its chairman and eight of its functional and commodity chiefs, in addition to Mr. Legge.

Each of the consuming agencies of the Government was requested to present at the daily meetings of the division its requirements for as long a period as possible, preferably six months or a year. After general discussion and examination from the composite point of view, the digested requirement schedules were referred to the appropriate commodity sections for detailed study and comparison with the resources and facilities on which they would draw. From the commodity sections the projected requirement estimates went back to the departments from which they originated, with memoranda concerning the ways and means of supplying the requirements. Clearance of immediate demands was so involved with future needs that eventually even orders for current consumption went first to the Requirements Division for preliminary clearance.

Opinion differs as to the potency of the Requirements Division. To some of the energetic executives who were members of this division the hour or two spent daily in conference seemed largely lost time. They were intent upon the performance of the very pressing and very concrete immediate tasks, for which the days were never long enough, and they had a certain contempt for all formal conferences. General discourse, they thought, never got anywhere. They were all great individualists and one-man men.

On the other hand, it may be contended that the Requirements Division was really the great central coördinator of the whole complex war effort, more important than the War Council of the War Cabinet, besides which the latter were merely *conversazioni* which served to keep the heads of war agencies and the President informed of what was going on. Assembled under the ægis of the War Industries Board, the representatives of the departments were in the presence of action. The active, functioning executives of all war agencies, the men who were in actual touch with reality and engaged in shaping it, were daily brought together. Here each of them learned to see the limitations of his own projects in the requirements of other projects. Here they all rose to the common commanding point of view. Here they perceived how true it was in the long run that the undue current success of one was the ultimate impairment of that one and of all. In the conferences of the Requirements Division they learned the necessity of and in a very large way determined the budget of war shaped to the hard actualities of available supplies of materials and of labor. In a degree they learned the importance of looking ahead.

Broadly speaking, the various supply departments, considered as a whole, never arose to the opportunity that the Requirements Division presented. This was partly due to the hopelessness of attempting to forecast requirements in some lines, in view of the peculiarities of a war so vast and novel; partly to the failure of responsible officials to set themselves diligently to the task, and partly to the lack of an authoritative intelligence and reporting service on the part of the Board that could have represented it throughout the supply departments.

The War Industries Board should not have been content with having the departments represented in its organization, but conversely it should have been represented in the departments. It was entitled to direct knowledge of all that was being done everywhere that would eventually add to its burdens. To a certain extent this was done, notably in the case of the Emergency Fleet Corporation in respect of steel requirements, though this contact was more in the field of clearance than in that of requirements proper. The Steel Division of the Board sent its own men to the different shipyards to ascertain whether they were over- or under-supplied with steel, and even had President James A. Farrell, of the United States Steel Corporation, make a survey of the whole steel supply situation for the Pacific Coast yards. Another instance of converse interlocking was the designation of Clarence M. Woolley as the member of the War Trade Board specially charged with looking after the matters before that Board that were of interest to the War Industries Board.

On the whole, the navy outshone all the other consuming departments in its forecasts of requirements. This was to be expected in view of the fact that basically the navy must always be approximately ready for war, because it is not susceptible of rapid expansion; and because its peace-time organization was simpler and more compact than that of the army. Its purchasing was centralized, and as a corollary its requirements were more easily known and calculable. The navy did not have to rebuild in war, but only to build. Its organization was centralized; that of the War Department at the beginning was in separate water-tight compartments, erected by Congress and reinforced by usage, hedged about with exclusiveness, and defended with jealousy.

The Requirements Division, although fundamental in its functions and inherent in the progress of events, was actually born of an effort on the part of War Industries Board executives to break the news to the war agencies that a new and superior power had risen in the field of supply. Speaking with only that approach to accuracy that is reserved for general statement, it may be said that the war-making agencies did not relish the President's letter of March 4, 1918. They knew that team-work was necessary,

but they all considered themselves star players. Each agency could show you just how it was winning the war single-handed. The navy resented the newcomer because it was proud of its business efficiency and somewhat spoiled by popularity; the army was sore as a boil from relentless criticism, and had retired into its shell and was seeking to accomplish within itself what the War Industries Board was undertaking to do as an independent agency. The Food Administration, born under a lucky star and sharing the spotlight of popular favor with the navy, headed by a man who was a power unto himself, was distant to any approaches that might be construed, even remotely, as modifying its ways. The Shipping Board wanted to be left alone because conditions that were insuperable gave it all the friction it needed. And so on.

Proceeding along the lines of easy informality which was one of the roots of the War Industries Board's success in a world of shoulder-straps, salutes, and rank—an informality that had little respect for place and much for the man—the War Industries Board executives proceeded to interpret the new dispensation to the powerful departmental heads with whom they must coöperate. A less politic group, after the many months of patient effort to effect results by moral suasion and the force of competency, come at last into power, would have proceeded abruptly to use it. Instead of resorting to cold correspondence and formal notices, the new order was discussed around luncheon and dinner tables as between friends with a common interest and not as between rival contenders for power. The War Industries Board men laid much stress on the fact that they intended to give the fullest interpretation to the President's injunction to let alone what was being well done, but that it was evident to all that there was much which was not being done well because of lack of harmonious and understanding coöperation. Since all were agreed that team-work must be effected, why not take up the work with a frank intention of accomplishing it without friction?

Due largely to the influence of General Hugh S. Johnson, who was then in charge of the army's recently created Bureau of Purchase, Storage, and Traffic, and who was a

strong believer in the enlarged authority of the War Industries Board, the army chiefs, in principle at least, came quickly into line.

The navy was somewhat reluctant. The navy men had been forehanded and were proud of their success. Mutual sacrifice for the common good was too often at the sole expense of the navy. It meant that the naval bureaus would often have to give up advantages that were the fruit of efficiency. The navy's pride was placated, however, by earnest invitations to tell the War Industries chiefs how they should do their job. The army men were asked to do likewise. Out of these suggestions and the discussions that followed arose a decision to reveal frankly to each other plans and intentions and to discard competition.

Thus was born the Requirements Division wherein, if nothing more, there was a candid revelation of projects. Therein each supply department head became acquainted with the problems and troubles of the others and came to view them with sympathy instead of jealousy. In this friendly atmosphere many conflicts were adjusted basically on the spot, leaving only details to be worked out by the commodity sections where officers of inferior rank represented the army and navy. The big men saw the advantage of being at the fountain-head, and the Requirements Division was a meeting-place of chiefs rather than of delegates.

Although an outline of its composition has been given above, it was an elastic body. At times there would be as many as five officers present from each the army and navy. Presently official Washington began to sense the fact that the real control of coördination was firmly in the hands of the War Industries Board; that that was the place to go to get things done, and that the Requirements Division was the starting-point. The Department of Commerce asked for representation; the Capital Issues Committee discovered that the Requirements Division was indispensable to its function of rationing capital; the War Finance Corporation found it a head center of information as to what war-work plants were entitled to governmental assistance in financing their operations; the Panama Canal Commission "sat in," and eventu-

ally about all the war agencies, great and small, that had need of real information or coöperative assistance had their representatives at the meetings of the Requirements Division.

The advantage that this division, but little known to the public, had over the more impressive War Cabinet and War Council was in the composition of its personnel. They were neither the Cabinet members nor the heads of the great emergency agencies, prone to abstract discussions and harmonious agreements in principle who were so lost in a welter of pressing duties; they were the working executives — the men to whom action was second nature. An undertaking expressed by such a man in the presence of a group of his fellows who would keenly hold him to account meant concrete results. These officers, like their civilian *confrères* in the War Industries Board, were doers, not dignitaries.

The weakness of the Requirements Division was that, after all, it was not supreme over all requirements. It passed on requirements as they came within the scope of the War Industries Board. It did not draft them. It sought to modify them, but in the last analysis it did not have the right to say that from the general viewpoint they were fundamentally wrong. It was not at the apex because it was part of an organization that was originally subjective, and that established functions to deal with its own field. These functional implements were the great war-control instrumentalities, but it was sought to use them within one agency to direct others. Necessarily, even with the best of spirit and with the use of interlocking devices, they did not have the supremacy that would have flowed from complete detachment. Food, fuel, the Shipping Board, the Railroad Administration, etc., were agencies co-equal in rank with the War Industries Board, each with certain subjects to deal with. It was not logical to seek to direct them from within the War Industries Board. They were responsible to the President, and in the sense of authority they could be reached only through him. It was a cumbersome arrangement, but it worked because it was an organic growth rather than a made-to-order machine.

The army was always the requirements riddle of the War Industries Board. Not only was it the chief consumer and the great originator of requirements whose nature and volume



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THE "WAR CABINET"

Seated, left to right: Benedict Crowell, Assistant Secretary of War and Director of Munitions, representing Secretary Baker; William G. McAdoo, Secretary of the Treasury and Director General of Railroads; President Wilson; Josephus Daniels, Secretary of the Navy; Bernard M. Baruch, Chairman of the War Industries Board.
Standing, left to right: Herbert Hoover, Food Administrator; E. N. Hurley, Chairman of the Shipping Board; Vance McCormick, Chairman of the War Trade Board; H. A. Garfield, Fuel Administrator.

were violently variant, but its administrative organization was archaic and bureaucratically decentralized. As has been said heretofore, the War Department did not know its requirements even at the end of the war. That was partly inherent in the circumstances of the war, but even so there never came a time when any one office in the War Department was the pool into which led all estimates of requirements. Consequently, the War Department was never able to give the War Industries Board even a comprehensive estimate that was worthy of the name. From the beginning of the war until the last shot was fired, the War Department was struggling with internal reorganization intended to cure its business defects. Before the reinvigoration of the War Industries Board in March, 1918, the War Department seems to have had a sort of dual programme of traveling along with that body and, at the same time, of solving its business problems in an internal manner; that is to say, of building up its own system of contact with industry. This cannot be positively affirmed as being an intention; perhaps it was rather a tendency promoted by the long period of lethargy in the War Industries Board. At any rate, the War Department was very backward in developing the War Industries Board.

However, most of the officers who represented the War Department in the War Industries Board in various capacities were believers in the vigorous development of the Board. The contacts they there made with each other, with representatives of other departments, and with the competent civilians of the Board convinced them that all the Board needed to help them solve their most pressing problems was a much larger scope of authority than it had at first. Through them the War Industries Board was influential in promoting the reorganization and tightening up the supply agencies of the army. They found that the Board, adapting its organization to the natural classifications of industry, communicated with industry through commodity sections, and they proceeded to devise an informal, coöperative grouping of the officers engaged with supply matters into like groups.

Partly by voluntary consent and partly by pressure all the officers of the different bureaus and corps concerned in the buying of the same commodity came together and pooled

their immediate demands and their requirements so far as they knew them. Then a single officer was delegated to act for the army in respect of this commodity in dealing with the War Industries Board. This process was facilitated by the fact that the different buying agencies had been forced to adapt themselves to industry by classifying their needs according to commodities, which was a lesson largely learned from association with the War Industries Board.

Aside from this rather informal readjustment of purchasing, the War Department itself was endeavoring to effect such restriction of the bureaus and such aggrandizement of the General Staff functions as rather rigid statutory limitations would permit. By way of diversion from the immediate subject, it is worth while to remark that if Congress had let Elihu Root have his way when he was Secretary of War, the General Staff would have been endowed with ample authority over the hard and knotty bureaus. But Congress was so afraid of militarism that it insisted on the retention of the bureaus with the deliberate purpose of making the War Department many-headed and centrally weak. It succeeded so well that it almost lost the World War. Afterwards it spent several millions of dollars through a partisan House Select Committee on Expenditures in the War Department in endeavoring to prove that the war enterprise was a failure in every respect except in the minor item of winning the war. As yet Congress has appointed no committee to investigate its own responsibilities for the mistakes and blunders of the conduct of the war.

On January 18, 1918, General Palmer E. Pierce, who had been representing the army on the War Industries Board, was made Director of Purchase, and thereafter every commodity which was handled by more than one bureau had to be cleared through the Director of Purchase. About the same time the Quartermaster Corps was reorganized on a commodity basis into the following procurement divisions: Clothing and Equipage, Fuel and Forage, Hardware and Metals, Remounts, Subsistence, Vehicles and Harness, and Motors (later the Motor Transport Corps).

This centralization of buying was not, however, authoritatively effected and efficient until after the passage of the

Overman Act, which gave the President power to switch Government bureaus and functions around as he pleased. The General Staff Division of Purchase, Storage, and Traffic was then created, and the reform instituted by General Pierce carried on to a centralization of purchase, storage, distribution, and finance in that division under Major-General George W. Goethals. Thus the Quartermaster Corps faded away to a minor operating agency in the field. These major administrative reorganizations of the army were going on simultaneously with the reorganization of the War Industries Board in anticipation of or under the Overman Act, at which time, of course, the War Department had abandoned any plan it may have had of working out its own supply salvation independently of the War Industries Board.

General Hugh S. Johnson, who succeeded General Pierce when the latter went to France, although formerly sharing the prevailing army view of the War Industries Board as an agency of more or less obnoxious civilian interference in military matters, soon became a zealous convert to its principle and exerted himself energetically, both as army representative on the Board and within the War Department, to bring about a full functioning of the Board in relation to the army. At this time General Goethals, who had been recalled from retirement to become head of the Division of Purchase, Storage, and Traffic, was the member of the War Industries Board representing the army, but General Johnson was charged with the performance of the duties of the representation. To a profound belief in the functions of the War Industries Board he brought the assistance of a mind of exceptional clarity and logical grasp.

Colonel Charles A. McKenney, who was first associated with the work of the War Industries Board as representative of the Engineer Corps of the army on the General Munitions Board, became the army priorities representative, after the reorganization of the Board in the spring of 1918. He, also, was a devoted believer in the War Industries Board, and was greatly influential in interlocking the supply departments of the army with the Board. He was so completely supported by the Secretary of War that he was able to overcome the stubborn objection of army officers to accepting any sort of

instructions coming from an inferior in rank. A brigadier-general, for example, would be loath to accept priority directions from a colonel, failing to see that in such a matter the colonel was endowed with a special authority that transcended military seniority.

It is possibly true that General Peyton C. March, who as Chief of Staff has been well and deservedly described as the dynamo of the stupendous military effort America put forth in 1918, was never in deep sympathy with the work of the War Industries Board. As a professional soldier, reared in the restricted American military tradition of the complete separation of military and civil endeavor, he was inclined to the view that all war-making measures should be primarily under military control. Assuming in the General Staff as complete an understanding of industry and commerce as it should have of purely military affairs, and assuming also years of preparation as a Great General Staff, such would be the logical relation. Lacking these requirements, as our General Staff and army did, the creation of such a universal joint as the War Industries Board between the military establishments and industry was the better way. On one side it was blended with industry; on the other with the military. It understood the languages of both and interpreted them both ways. The slowness of its growth was well-nigh fatal, but it had the advantages of growth over those of an *a priori* creation. For that reason it was, on the other hand, a better supplemental agency than a statutorily created ministry of munitions would have been.

The failure to approximate and coördinate requirements with respect to each other, and the vital element of time, led to the temporary over-supply of some things and the under-supply of others; to the production of parts of military equipment before their complementary parts; as, for example, guns and their carriages. The outcome was that in the last months of the war millions of tons of shipping space were used to carry to France *matériel* that would merely cumber storage space at the very time that Pershing's army was on the verge of ceasing to function for lack of motor and animal transport. It is quite true that the programme for the supply of motor trucks was laid down before the

torrential rush of divisions to France was foreseen as possible. On the then known capacity of the "neck of the bottle," there was ample time for refinements of standardization and other approximations of perfection; but when the neck widened and soldiers sped through it by the million the transport was not ready to go with them. At this stage, however, a cold-blooded effort at coördination of the effort in man power and in *matériel* would have been paralyzing. General March concentrated his energies on a stupendous massing of man power in France and left the rest to Providence and the Allies who cried out for infantry and machine guns at any cost. The American response was 2,100,000 soldiers in France when the war ended and machine guns enough complete for an army of 7,000,000.

"I am apprehensive that the Americans will miss the 1918 train," said Marshal Foch in February.¹

Thanks to March they caught it.

With terrific energy March availed himself of every troop transport that could be brought from the far ends of earth, and as fast as they arrived they were loaded with fighting men.

"How will they get to the front?" some one asked the General. "Let them march," was the answer.

And the General was right. An American soldier in France, even three hundred miles from the battle line, contributed greatly to the cause of victory. He presented, at the very least, an irresistible moral unit. Transport was lacking, but subsistence and the soldier's personal equipment seldom if ever failed.

However, the cablegram from Pershing that his army would cease to function unless transport was provided caused a diversion of forwarding energy, or, rather, an additional concentration of it on transport equipment.

As an illustration of the impossibility of definitely solving the problem of requirements in a uniform manner, it may be said that on January 1st the military programme called for the delivery of 100,000 soldiers in France in the month of July, 1918. The actual number transported in that single

¹Not a literal quotation. See *America's Race to Victory*, by Lieutenant-Colonel Requin, page 149.

month was 306,000. For the spring of 1919, which was expected to see the culmination of the war, there were to be 4,000,000 American soldiers in France. Much of the *matériel* for this colossal force was ready before certain *matériel* that was currently needed, and the anticipatory goods represented a considerable portion of the 5,153,000 tons of army cargo shipped to France during the war.

The army transport fleet grew eventually from virtually nothing at the beginning of the war to almost five hundred ships of a total tonnage of 3,800,000 — more than twice the entire deep-sea merchant marine of the United States in 1917. The most optimistic did not consider such an attainment within the realm of possibility a year before. This amazing expansion of the neck of the bottle upset all programmes, and in the rush to utilize it at the moment requirement projections were overlooked. Even the troop reserves to keep the Atlantic conduit filled were overlooked, and General Crowder, supplier of men, was as much in the dark as to requirements as the material supply agencies were as to the subsistence programmes.

The writer would have it understood that these matters are set down in no spirit of belittling criticism, but rather as a statement of important fact, for future reference and consideration. His remarks herein should always be read with their context. What the army accomplished in supply and transportation, quite aside from the proper military function, would have been remarkable even if it had been modernly organized for the task before the war began and had had from the beginning the support of an efficient War Industries Board. To have done what it did whilst in the throes of reorganization and expansion from less than two hundred thousand men to four million entitles it to unqualified praise without in any way detracting from the recognition that is due the civilian agencies whose coöperation was indispensable.

Nevertheless, the disposition of the problem of current requirements might have been handled with more foresight. Officially the army supply department was not aware that the programme of 100,000 men a month for France jumped to 245,000 actually transported in May. Not until the middle

of July was the supply department formally notified to take care of 250,000 men monthly.

Much less was the War Industries Board authoritatively informed of the new programme. When by chance Mr. Baruch did hear of the Pershing cablegram, there was a tremendous scurrying to meet the situation, and a great forward step in civilian power within the army. There was a frank interchange of views between the Chief of Industries and the Chief of Staff which made it plain that the time had come when the army must acknowledge civilian supremacy in the fundamentals of supply.

When the war ended, more than thirty-four thousand trucks had reached France, and they were going forward at the rate of ten thousand a month, besides a very large number of other motor vehicles, such as ambulances, passenger cars, motor-cycles, and tractors. Fifty-four thousand horses and mules had arrived in France, and were moving to the front at the rate of twenty thousand a month.

It is probably an overstatement of the situation, as made to the author by a general officer who was in France, that the armistice came just in time, on account of the maladjustment of supply transport to personnel, to prevent a "terrible catastrophe." Had the train of circumstances been different, this maladjustment probably would have resulted in the passivity of the American army, with the probable consequence of the postponement of the final scene of the war to the spring of 1919, in accordance with the Foch programme prior to the great Marshal's determination to take advantage of German weakness to impose a decision in 1918.

This possible near approach to a disaster should afford a lesson not to be rejected, that in any future war on the modern scale the army must cordially entrust supreme control of supply requirements to a civilian agency, such as the War Industries Board or its equivalent.

The complement of the Requirements Division was in a broad sense all the rest of the War Industries Board, functional and subjective. The common purpose of them all was to establish a balance between requirements and resources, or between demand and supply. Theoretically the Requirements Division determined demand and the rest amassed

resources. Yet there were certain units of the organization whose special function was to study, develop, and manipulate resources in a broad way. They dealt with internal industrial strategy. They sought to work out a territorial diffusion of war industries; to overcome local congestion; to prevent the waste of industrial capacity tending to arise from the restriction of some less essential industries and the complete stoppage of others by the necessities of war; to prevent the American war programme from interfering with the supply programme of the Allies; to husband transportation through the location of war plants contiguous to their materials and to labor; to guard the industrial fabric from unnecessary dissolution; to see that, while the limbs of the industrial body were developed and trained for war, the trunk was not exhausted; and, above all, to increase all essential production; for war has not only peculiar needs that involve new production, but it enforces more basic production, for what it consumes must of necessity be largely added production of what the nation ordinarily uses.

The first agency in this field was the Industrial Inventory Section of the Council of National Defense, which took over the industrial inventory compiled by the Committee on Industrial Preparedness of the Naval Consulting Board and which also utilized the Kernan Report. This section undertook to expand and revise its initial data, and digest such other data as it could obtain. Then, as the War Industries Board grew to its task, there were created the Resources and Conversion Section, the Facilities Division, the Advisory Committee on Plants and Munitions, and the Division of Statistics and Planning. The commodity sections and divisions were the best sources of information as well as the chief agencies of its application to the general problem of marshaling resources and facilities.

Outside of the Board such governmental agencies as the Census Bureau, the Bureau of Mines, the Geological Survey, the Bureau of Standards, the Forestry Service, the Statistical Bureau of the Department of Commerce, private commercial reports, and the statistical records of corporations and business associations of various kinds were drawn on. The Industrial Inventory Section found that much of its raw

material was not in such form as to give the desired knowledge. The Industrial Preparedness Survey showed the capacity of manufacturers to produce certain definite articles. But what was needed was knowledge of the industrial processes used, so that it would be possible to determine a plant's adaptability to the manufacture of an article quite different from its normal output. By May, 1918, the section had reclassified factories according to processes and had added about eight thousand more to the original lists, making a total of approximately twenty-eight thousand.

The creation of the Resources and Conversion Section in the spring of 1918 marked the beginning of the systematic, centralized use of the information compiled by the Inventory Section. In the fall of 1918 this work was subdivided by the creation of the Facilities Division. To formulate and digest the statistical information that was collected through so many channels and was subject to use by so many agencies, it was early found advisable to establish a statistical division. This division was found to be invaluable by the General Staff, and it eventually annexed it almost *in toto* as its own statistical division, giving officers' commissions to Dr. Leonard P. Ayres, its chief, and to most of his assistants. It then became necessary for the War Industries Board to replace it with a new organization — somewhat broader — called the Division of Planning and Statistics of the War Industries Board. Its organizer and director was Dean Edwin F. Gay, who was already at the head of a like division in the Shipping Board and of the Bureau of Research and Tabulation of Statistics in the War Trade Board.

The presentation of the work of these bodies having to do specifically with resources and facilities will be reserved for later chapters. With their enumeration and denomination we complete the picture of the overhead machinery of the great task of balancing resources and requirements. In a large measure requirements were always represented by x , and resources were always capable of some extension. But the War Industries Board effected such a channel between them that Mr. Baruch was able to say in his preliminary report that "not one default was recorded on any demand made by the military establishments."

CHAPTER VIII

DISCIPLINING A NATION: PRIORITIES IN PRINCIPLE AND IN ACTION

The torrential demand for goods—Visualizing a nation's need—The making of an explosive shell—Everybody for himself—What priority is—Priority becomes a center of power—"Essential" *versus* "non-essential" industries—Rationing a people and their commerce—The parable of the eggs—"Class AA" to "Class D"—Business and the spirit of common service—The army calls for underwear—The national policing of industry—Locomotives, steel, brass, nitrate, acetone, coal, cotton—Which first in the race against time?—Saving the French 75's—Pershing wants mules—Priority supreme.

WITHIN three months after the United States entered the World War the War Department alone issued, chiefly into a limited industrial district, more than sixty thousand orders for goods and materials. Over this initial flood there poured until the end of the war a vast and violent stream of demands for myriad products.

Before the raging torrent industry was swamped. Unimportant goods were made before essentials, freight was produced without cars, and carloads were delivered at the ocean front without ships; all Government orders were "rush," and thousands of army and navy officers and flocks of agents of the Emergency Fleet Corporation and the Food and Fuel Administrations goaded the producers to a fury of disordered effort. Freight piled up at the ocean terminals until freight trains could no longer reach them and had to discharge their burdens in the fields, ten, twenty, thirty miles back; internal railway yards were so chaotically blocked that cars had to be lifted off sidetracks with wrecking cranes to get them on their way again.

Even as the deluge grew and the disorder advanced, two-score Government purchasing agencies beat the whirlpool to froth with their bidding and scheming against each other, each obsessed with a mad determination to achieve his own goal. To their able assistance scurried a cloud of speculators and jobbers and "shoestringers," inflating demand by

the multiplicity of their "middling" efforts. Original orders invariably involved secondary orders for materials and parts and, perhaps, half a dozen inquiries for each sub-order; and the sub-orders were again split and resplit, and each appeared in the most unexpected places.

Thus, even the capillaries of industry were congested, and confusion arose in the most remote and unexpected parts of the industrial body. Transportation was turned into a hurdy-gurdy by cross-hauling and, above all, by preference. Everything for the Government was preferred until there was no longer a semblance of preference, and the last had a better chance than the first. Manufacturers swallowed orders and yet more until their files were gorged, and still they accepted orders and struggled for more. Serious shortages arose at the same time that the greatest industrial community in the world was headed for asphyxiation in its own product.

Such was the malady of the industrial body that the War Industries Board was called upon to heal. The cure was undertaken by administering the hair of the dog that gave the bite. The stampede for preference caused the congestion; the enforcement of graded preference, which was the specialized meaning the word "priority" came to have in war industry, eased if it did not terminate the congestion.

Modern war not only taxes the resources of a nation for the production of essentially military supplies, of which the consumption is not large in normal times, but at the same time puts a heavy additional strain on the production of many articles of ordinary use. Offhand one might think that five million men taken from civil life and put into the army would merely change the destination of their usual personal supplies. In fact a soldier, if he is always fit in equipment, wears out shoes and clothing, for example, about five times as fast as a civilian.

The army purchased in 1918 far more woolen socks than the entire normal annual production of the United States, twice as many blankets, three times as many part-leather gloves; it took all the wool and all the steel. In some lines of commodities forehanded bureaus early cornered all the production for months, if not for years. Add to these abnormalities the stupendous demands for munitions, of which

the peace-time production is negligible; reflect that each of these war items subdivides into many industrial sources and manifold processes, and that they all converge on an industrial life already disordered by increased demand for ordinary goods and the disruption of normal methods by the withdrawal of men and transport, and it is easy to see that the self-control of ordinary times will not serve industry in war.

These production strains in ordinary industry had to be met by sixty-six men where formerly a hundred had been occupied, with the help of a few women and children; for twenty-four of each hundred of adult male workers had been diverted to production for military purposes, and ten were in the army and navy; moreover, the war workers and the fighting men were physically, at least, the cream of the hundred.

A shell for a gun requires scores of raw materials of the most diverse kind, numerous processes, many finished materials, and a great variety and diversity of human and machine work. The ore-miner in Minnesota, the coal-miner in Pennsylvania, the coke-maker in West Virginia, the brass-worker in Connecticut, the copper-miner in Arizona, the maker of chemicals in New York, of explosives in Delaware, of milling machinery, of steel, of iron, the transport-worker — all these and many more must synchronously converge their efforts or there will be no shell. Let even one of them fail and the shell fails.

A hundred thousand things besides shells were required by the Government in the war work — many of them fully as composite and complex. They intermixed and intertwined with each other in materials, labor, facilities, and transport. More of one meant less of another; the maximum of one meant none of many others.

Here was the making of the worst tangle of disordered effort the world has known. All of this turbulent torrent of production must be regulated in velocity and volume. This was accomplished through priority which was the synchronizing device whereby each factor did its part at the right time and the measuring device whereby it did its part in the right volume. It was by far the greatest mechanism of industrial

control the World War produced. Its like was never seen before and will never be seen again short of the perfect socialistic state.

Priority, with experience and study, became the most efficacious implement of Government ordinance of industry. It was the sturdy shovel with which the War Industries Board cleared up the blockade and kept the tracks open. It was nothing less than a great system of industrial and transport precedence, automatic in the main, manipulated in the exception, whereby production was ordered, restrained, or stimulated to meet current and projected war demands and prevent the civil population from suffering destitution in the midst of prosperity. In effecting these immediate ends it automatically checked profiteering and repressed prices.

In its ultimate effects, often under other names — such as allocation and curtailment — it impinged not only upon industries, but also upon persons. To some it brought business and prosperity, to others hardship and poverty. None escaped its mandates. The Nation was “prioritized” — and yet there was no collective statute of priorities. Founded on limited legislative enactment, it was without statutory buttresses or punitive supports, and it pursued its way from particular to general and back to particular power by the circuitous route of “request,” instead of the straight highway of command. Based on reasonableness and obvious necessity, few questioned its decisions and none dared oppose them. It was coöperative democracy at its highest power, even in an institution which was predicated on the “consent of the governed.”

In the beginning supply departments poured out orders with as little concern for the consequences as though they were merely dumping letters into mail-boxes. This was due to the decentralization of purchasing authority imposed by statute and to the failure of the army to appreciate that, if in modern war the Nation's industry as a whole is the commissary department of the Nation in arms, it is subject to overstrain and exhaustion just as much as the more particular commissary of the tactical army.

The only rule of preference was the good old one of the feeding-trough — first come, first served; except that as be-

tween the army and the navy there was an understanding¹ between the two Secretaries that the navy was for a time to have the right of way over the army. This understanding — which was more honored in the breach than in the observance — was probably based on the hypothesis that, as the navy was on a near-war footing in time of peace, it should be allowed to complete the comparatively small effort that would effect the transition and thus get into action at an early date; whereas the army was so remotely distant from readiness that early precedence for the navy would not appreciably affect its exertions.

Between this preference of courtesy and what it seized in the ancient way, the navy had about all the preference there was at first. The navy had the advantage of a compact organization, a very clear knowledge of what it wanted and of about where it could get it. Indeed, the navy was so well conditioned that it was inclined to view with distrust the injection of civilian assistance into the situation. Its own good-fortune inclined it to question whether elaborate direction of the production and delivery of supplies was necessary; and when it did see the gravity of the situation, it seemed that for the navy to surrender any of its advantages for the prior benefit of others would be merely to dissolve the last solid support in a slithering morass of confusion.

Within the army, the Signal Service and more especially the aircraft division thereof appears to have got started ahead of the other bureaus and divisions. In consequence, we hear little of the troubles of the aircraft production task, huge as it was, in the proceedings of the War Industries Board. The Aircraft Board was not lacking in foresight and the volume of its requirements was early established. It placed the bulk of its orders with the automobile industry, which was particularly qualified to meet them with a minimum of interference with other supply processes, and its spruce problem was so vast and technical that it was allowed to handle the whole matter independently of the War Industries Board, except, of course, as the Board used its powers to assist the aircraft managers in putting through their projects. No

¹ "As between the army and the navy, priority should be given to such needs of the navy as are intended to be completed within one year." (Minutes of the Council of National Defense, April 28, 1917.)

analysis or appraisal is here made, however, of the American aircraft programme. That, indeed, is another story.

The Shipping Board did not get under way with its contract ships — as distinguished from requisitioned — as soon as the aircraft people, and its requirements projected a torrent of orders into the already choked stream of demand.

We have seen how clearance, a form of priority at the source, was introduced to check and systematize the flow of orders, and we have observed in a general way the efforts to balance requirements as against compilations of resources — of which we shall see more further on; but neither clearance nor the effort to effect an equilibrium in the mass between requirements and resources solved the problem of precedence of production, though they were important contributory factors.

The final and effective step was the calling in of the principle of priority, which like so much else of the war implementry was not so much an invention as a product. War industry had not been going very long before manufacturers became bewildered by the clouds of Government orders for which expedition was demanded. Among many first, which should be first? They turned to Washington for direction, but who was to decide among a score of buyers, each of whom could see the issue of the war pivoting on preference for his particular supplies?

The demand for a programme or at least schedules of preference in production was the natural complement of the simultaneously perceived need of method in the placing of orders. Indeed, to clear orders is merely to institute priority at the beginning. However, the two phases of one task came up as presentations from opposite directions, and both were referred to the Council of National Defense which through the General Munitions Board established a clearance committee, as we have already seen, and at about the same time — May 3, 1917 — set up a priorities committee.

At that time the priority function, as defined by W. S. Gifford, then director of the Council, was that of determining "priority of delivery of materials and finished products, whenever there is a conflict in delivery, in accordance with the general policy of the Government." "It is further under-

stood," this definition continues, "that at present the priority committee of the General Munitions Board has no power in regard to the determination of priority in regard to civilian needs in which the army and navy requirements are not involved. It is further understood that, as between the needs of our allies and of our civilian population, the priority committee of the General Munitions Board has no authority to act."

The Board had declared for a real priority system, but war was not yet the paramount business of the Nation; and a council composed of the heads of six great Executive departments, each jealous of power and humanly ambitious for war honors, held inherently too many of the elements of indecision and procrastination. Also, it was reluctant to enter the limitless field of general industrial control, which a complete priority system would have involved, in view of the vagueness of legislative authority for such an enterprise. In determining priority for Government business, it was on safe ground because it was authorized to act for the army, the navy, and Shipping Board, on which priority rights had been conferred by Congress. At that stage of the development of the general public's war spirit or that of industry, the approval of those affected by the Board's requests could not have been counted on. Later on, the War Industries Board had the legal basis for priority regulations that flowed from the Lever Food and Fuel Act and the Transportation Preference Act of August 10, 1917.

Although in transportation only did it have direct legislative authority relating to priority, the pooling of the powers by which priority could be enforced gave the Board a club with which to enforce regulations; but in all matters of priority in civilian goods it was without legal authority to order the doing of the necessary things, which it was in a position to enforce by indirect pressure. In these circumstances the Board felt it was more politic to request than to demand compliance with its regulations. It was no offense for an irate manufacturer who was far down the priority list to consign the Board and its chairman to inferno and flatly refuse compliance with its requests; on the other hand, the Board was not exceeding its authority if it arranged for

the Fuel Administration to refuse coal to the obstructive manufacturer, and for the railways to deny him cars. Of course, he had to come into camp.

Yet it is important to point out that if industry had not early become animated with the war spirit of sacrifice and accommodation, and had not perceived the necessity of unity of action and discipline in its sphere as much as in the purely military sphere, the War Industries Board's career might have been one of endless bickerings and squabbles to an inglorious end by Congressional action. After the Government took over the railways, the occasional rebel did not have a chance unless he was absolutely independent of railway transport and fuel.

The War Industries Board was wise enough to pivot all priorities on the Transportation Preference Act. Under the act the President appointed Judge Robert S. Lovett, chairman of the board of the Union Pacific Railway, as Director of Transportation Priorities, and he was made Priorities Commissioner of the Board. A new priorities committee was then formed with Edwin B. Parker as chairman. This was in the latter part of August, 1917, so that it may be safely said that priorities as a system was not really developed before the fall of 1917.

It came to its zenith in the reorganization of the War Industries Board, following Mr. Baruch's appointment as chairman. At that time, Judge Lovett having joined the Railroad Administration, Judge Parker, as he was familiarly known, had become Priorities Commissioner and was rapidly building up the Priorities Division. The Priorities Commissioner, besides having the statutory control of preference in railway transportation, was authorized by the President, the Secretary of War, the Secretary of the Navy, the chairman of the Shipping Board, and the president of the Emergency Fleet Corporation to exercise by himself and through the Priorities Committee such powers as they had respecting preference.

Finally, the President's letter of March 4, 1918, to Mr. Baruch, which was in effect an Executive order, conferred on the War Industries Board for priority purposes all the implied war-time powers of the Executive. At this time the

feeble and merely advisory priorities committee of the spring of 1917 became a stalwart agency of industrial administration by Government. It was a potent factor in price-fixing, in conservation, curtailment, conversion, material rationing, regional dispersion of industry and general regulation thereof; and its application shaped the draft on man power for the army and navy. Just as the War Industries Board intertwined itself among virtually all Government agencies, so the priorities function and power were mixed with almost everything the Board did.

The Priorities Division¹ consisted, besides the Commissioner, of two bodies, the Priorities Board and the Priorities Committee, of each of which the Commissioner was chairman, and three sections for the special administration of priority in regard to transportation, labor, and non-war construction. The Priorities Board was the moulder of policy and the Priorities Committee more of an executive, especially in routine and minor matters.

The Board contained in its membership representatives of the great purchasing and economic control bodies of the Government, including the Emergency Fleet Corporation, the Fuel Administration, of the Allied Purchasing Commission, of the navy, of the Railroad Administration, of the army, and of the War Trade Board. The committee was something of a mongrel in its composition, being made up of functional members, commodity representatives, and representatives of the army and navy as such, its composition

¹Major-General J. B. Aleshire was chairman of the original Priorities Committee under the Council of National Defense. The membership of the Priorities Board, as finally organized, was: Edwin B. Parker, Priorities Commissioner, chairman; Bernard M. Baruch, *ex-officio*; Major-General George W. Goethals, army representative; Clarence M. Woolley, representing the War Trade Board; Edward Chambers, representing the Railroad Administration; Charles R. Piez, representing the United States Shipping Board and Emergency Fleet Corporation; P. F. Noyes, representing the Fuel Administration; T. F. Whitmarsh, representing the Food Administration; Alexander Legge, vice-chairman of the War Industries Board, also representing the Allied Purchasing Commission; and Felix Frankfurter, chairman of the War Labor Policies Board. H. G. Phillippis acted as secretary.

The following was the personnel of the Priorities Committee: Edwin B. Parker, Priorities Commissioner, chairman; Charles K. Foster, vice-chairman; members, George Armsby, H. H. Barbour, W. W. Chase, Percy Holbrook, J. M. Hopkins, Henry Krumb, F. H. Macpherson, Rear Admiral N. E. Mason, Lieutenant-Colonel C. A. McKenney, Everett Morss, Lucius P. Ordway, T. C. Powell, Rear Admiral A. V. Zane. Maurice Hirsch acted as secretary, and Marcus B. Hall as assistant secretary.

being designed for administrative detail rather than for counsels of policy.

Stated in the simplest terms, the functions of the Priorities Division were "to determine, whenever necessary, priorities of production and of delivery and the proportions of any given article which are to be made accessible to the varying demands for it." This — the War Industries Board's own definition — points out that production priority involves priority in respect of plants, fuel supply, electric energy, raw materials, finished products, labor, and transportation in every form. The object of the priorities system, it was explained, was "by means of its function to resolve the conflicts that arise in the execution of the military and industrial programmes over the production and distribution of commodities and the use of incidental agencies."

As the interdepartmental formulator of "general plans for the coördination of the military programme, as presented by the military authorities, and the industrial programme, in so far as such programmes demand priorities," and as the designer of the agencies for the carrying out of the programmes, the Priorities Board became one of the mightiest centers of power in the Government. As the Requirements Division brought all the Government departments and agencies vitally interested in war problems together to study and order requirements and to project policies into the future; so the Priorities Board brought them together to coördinate policies in their concrete application to production and delivery. The former sought to harmonize future demand; the latter to meet formulated and projected demand and coördinate them in fact. The difference between priorities in the early war days and priorities under the fully organized War Industries Board was the difference between night and day.

The Requirements Division and Clearance paved the way for automatic priority for the direct demands of the army, the navy, and of the Shipping Board, but the Priorities Board had to lay down a large scheme of group and individual priorities to protect the ultimate supplying of such demands and to restrict civilian consumption of foods, materials, and facilities to the barest minimum consistent with national health and safety. Except as food and fuel were already

controlled by their respective administrations, the War Industries Board now, through priority, came into control of virtually the whole industrial life of the Nation, and, through the relation of priority to the selective draft, in that it determined what were essential and non-essential industries, affected the personal destiny of millions.

General Crowder issued the dictum: "Work or fight." The War Industries Board determined the choice for vast numbers of men between the camp and the shop or office, for its policy was to close out or curtail industries unnecessary for the time being. Even more directly, the Board indicated to General Crowder the occupations he could cull for soldiers without danger of serious civil impairment.

The complex problem the priority function was to solve was fundamentally the ordering of the whole materially productive life of the country so as to serve military wants in the order of need to the greatest possible extent consistent with the maintenance of the fabric of economic life and of the physique and morale of the civilians.

It necessarily involved not only the application of preference as between nations, between domestic military and civil needs and among categories of military requirements, but also of discrimination in civil requirements. It involved in a broad sense the rationing of all the people and of all the industries. It was obvious that it was physically impossible to take each and every one of some thousands of commodities (though possible and actually practiced with certain basic commodities) and determine a system of fractional priority or participations, by which every necessitous demand would be met in the degree considered advisable. It would have been almost as hard, even if the total supply of commodities had been directly under the administration of the Board, to assign to each valid application for priority the precise numerical order of its participation.

In fact, the War Industries Board had to work priority without knowing definitely just what was the full legitimate demand and what the total supply with which to meet it. It had to take a chance on the unknown and lay down a fixed rule of access to materials and facilities in accordance with the relative importance of certain general requirements in

respect of the big national business of winning the war. It was quite prepared to see dispensable industries find the stores exhausted when their turn came, but it had to depend on its judgment and on the willingness of the people to bear privation as to whether some of the minor so-called indispensable requirements were met.

The simile of eggs in a basket was used by General Hugh S. Johnson to present the solution of the problem in a graphic manner. A, B, C, and D have varying needs for eggs of which the basket contains an unknown number. Because of uncertainty as to the number of eggs, it is impossible to allocate them according to intensity of need among the four applicants for them. For the same reason it is not certain that A and B, as representing the most pressing demands, can be supplied by definitely curtailing C and D. Assuming, however, that A's need is paramount, we can say that he shall take the eggs so long as he needs them, and that thereafter B, C, and D may indiscriminately help themselves or have singular access to the balance according to the relative importance of their wants. If none of the three represent indispensable industry, it may be convenient to let them help themselves; or, if they vary in importance, it may be advisable to give B first chance at what A leaves, and so on. This is the skeleton of the priority system. It had its dangers, but it worked despite the fact that the War Industries Board did not attempt to police A, B, C, and D, and further despite the fact that it did not itself hold the eggs, even unknown as they were.

The four groups of the parable increased as the war went on until on July 1, 1918, Circular No. 4 made them coincident with the population by saying, "During the war in which the United States is now engaged all individuals, firms, associations, and corporations engaged in the production of raw materials and manufactured products (save foods, feeds, and fuels) are requested to observe regulations respecting priority" — and, of course, through the proper administrations priority was applied to the three exceptions.

Priority was localized in the War Industries Board and was its creation, but the composition of the Board made it the fountain-head of the application of the priority principle

for the Government as a whole. In this aspect it had a certain weakness, for, although presidential authority always stood behind it, there was a degree of lost power in applying it through bodies that were organizationally as supreme in ships, external trade, foods, feeds, and fuel as the War Industries Board was in the general field of industry. A perfect organization would have had the Board, or at least the priority administration, unquestionably supreme in the whole field of production.

The original Priorities Committee got under way in a comprehensive manner on September 21, 1917, when it issued Priority Circular No. 1, giving general directions and information as to procedure under its authority. It directed that iron and steel producers should "rate" their orders for products. Before that time large numbers of priority questions had been decided individually, but thereafter there was a formal system of receiving and granting applications for certificates of priority. The first certificate was issued on September 25th, and from that time until the suspension of priority after the armistice more than 211,000 applications were dealt with. On the record day for applications 1901 were received and the maximum number of certificates granted on one day was 2121.

The method of rating established by the first circular provided for the division of all work and orders into five classes alphabetically designated according to order of precedence. Class AA comprised all urgent and exceptional war orders; Class A included all other war work in general, such as arms and ammunition, naval and merchant ships, airplanes and locomotives; Class B was made up of demands for production which, while not primarily for war purposes, were necessary to the maintenance of national vigor; Class C took in all orders and all work not covered by priorities certificates or by the later established automatic ratings which contributed to purposes entitled to preferential treatment, as set out in a preference list. No certificates were required in this class nor in Class D, the residuary class.

There was further subdivision of the classes. For example, to start the systematic work of administering priority with a clean sheet, all orders for products given by the War and

Navy Departments and the Emergency Fleet Corporation before September 1st, were put in Class A1. The application of priority, according to these ratings, did not mean that every order received by a factory should be first attended to according to its rating, but only that the rating should be so observed as to insure the completion of each job in the contract time. Thus the reception of an AA order did not mean the dropping of work on other orders so as to complete the AA order first, but only such a modification of factory procedure as would insure the filling of the AA order within the prescribed time. The Priorities Committee did not undertake ordinarily to issue precedence orders to each producer. The holder of a certificate of priority called for his materials and facilities from other manufacturers and exhibited his certificate in order to obtain the place in their manufacturing schedules to which it entitled him.

In time, it developed that automatic ratings could be assigned to a considerable portion of orders, and when all industries were put under control July 1, 1918, a scheme of automatic ratings was simultaneously applied, which avoided an administrative breakdown from the immense amount of detail that would otherwise have been involved. Under this scheme the recipient of an order which would naturally fall into certain of the lower ratings would attend to his own priority rights, supporting his orders under them with an affidavit setting forth the facts entitling him to the rating named.

The Priorities Board and the Priorities Committee issued circulars defining the classification of purposes demanding preferential treatment, the one issued by the former on the day of its establishment, March 27, 1918, being the final one and having the superior authority that came with the wider scope of the board as distinguished from the committee. This general classification of purposes was later supported by a list of preferred industries, divided into four classes of preference, which was extended until it covered seventy-three industries and specified seven thousand plants whose product was of such a nature that it was considered that they should have special ratings above or below those into which they would fall according to the classification of purposes. The

first class of industries had preference over all others in the production and supply of fuel and electric energy, transportation, and labor. The distinction between the three remaining classes was not hard and fast in practice, but was made rather as a means of giving a general view of the relative importance of different kinds of industry.¹ All four classes enjoyed precedence over unclassified industries.

Priority, of course, was as inevitable as the force of gravity, as a part of any system of industrial control for war purposes. It was part of the munitions administration of all nations. A unique feature of its American use was that it was essentially voluntary and coöperative. The main lines of priority were virtually acquiesced in by what amounted to a congress of industry, before they were decided upon. Individual applications of priority were almost invariably approved by the judgment of those adversely affected when they were asked to decide for themselves in view of the general need and welfare. The annals of the War Industries Board are replete with instances of men and corporations writing their own death-warrants, as it were.

Objections to priority regulations almost without exception proceeded from the isolated, individual point of view. When a complainant came to the War Industries Board bursting with what seemed to him righteous indignation, he would cheerfully reverse himself when the public welfare point of view was presented to him. The spirit of service for the common good was ultimately supreme in all men in those times. The American business man never showed himself more favorably than in his relations with the War Industries Board. When the hour of sacrifice came, he gave his business to the Government as freely as he gave his sons.

The writer believes that the War Industries Board, after March, 1918, had ample power to effect anything it undertook, however vague, indirect, conditional, legal, or non-legal that power was. It is true, however, that most of the big business men in its service hold the view that, while its

¹For texts of circulars and orders of the Priority Board and the Priority Committee and administrative details see *American Industry in the War* (Government Printing Office, Washington), being the final report of the War Industries Board; and the War Trade Board's *Government Control of Prices*, issued in coöperation with the War Industries Board.

moral and effective power was practically unlimited, its legal authority was so precarious that it effected its ends by sufferance rather than by authority. This position is doubtless due to the fact that, because of the opportunities for legalistic casuistry concerning many phases of the Board's work, and because there was a time when it had no authority, these executives had got into the habit of asking coöperation. It was so freely granted that they rarely had to think of the power behind them, and, in fact, they hated to appeal to it. When you do not have to use power to effect common action, you prefer to forget that you have it. A reasonable, flexible, human organization, like the War Industries Board, undoubtedly derived more dynamic force from the spirit of coöperation it encouraged than a rigid, statutorily superimposed executive agency could have commanded. Such an instrumentality might have enforced all that the law required, but the coöperative medium got far more. All men work better "for us" than "for you."

Priority administration had an effect that was somewhat beyond the domain of the War Industries Board in the strict conception of the latter. Even when his powers were practically unlimited, Mr. Baruch held the view that the Board was not to interfere in purely military matters; that, broadly, it was for the war-making agencies to determine what they required of industry, and for the Board to see that they got it.

But, in seeking to meet these wants through priority and allied functions, the Board was many times forced to inquire whether military demands could not be modified or restricted. At one time the army actually called for twenty suits of underwear for each soldier in France, on the theory that because of vermin they would have to be thrown away at the end of a week's use. The strain of such an order on the knitting industry led to inquiry, the systematic use of delousing apparatus, and the substantial reduction of the order.

There were many similar cases — often leading to wholesale cancellations; but in general the Board accepted military estimates, with the result that many industries were overstrained in efforts to produce within a short time things that would not be used up for a long time. Of course, the long, precarious, and slowly operating supply line between

America and France necessitated that several months' consumption requirements should always be *en route*, in addition to prudent reserves; but, even so, there was an insistent effort to obtain more than the country could produce. It was not physically possible to buy and obtain within a year the amounts of goods represented by army funds set aside for that purpose — more than \$15,000,000,000 in 1918. Had the War Industries Board been projected a little more into the military estimates of requirements, there would have been a much more equable flow of orders.

By the instrumentality of priority the War Industries Board directed both production and distribution; it said what should be produced and where, and it said who should have the product. After the Board had extended its control to all industry not otherwise under Government control, American industry was for the time being nationalized as to management; and, through the war and excess profits tax and surtax, nationalized as to profits. It performed services according to Government direction and for the profit of the Government.

Individualistic American industrialists were aghast when they realized that industry had been drafted, much as man power had been. What none had foreseen had come to pass. Had any man said in 1916 that the whole productive and distributive machinery of America could be directed successfully from Washington, he would have been called a lunatic. Yet in 1918 that was being done. That it was a fact and not a theory was due to the transcendent spirit of the times. Business willed its own domination, forged its bonds, and policed its own subjection. There were bitter and stormy protests here and there, especially from those industries that were curtailed or suspended. Few men are great enough to see with equanimity their factories silenced when all around them is the clamor of unwonted business activity. Yet ninety-nine times out of a hundred the most resentful voluntarily made the sacrificial choice when asked: "Will you take this material or will you let the boys in France have it?"

The administration of priority was a complex and delicate task. Should locomotives go to Pershing to help him get ammunition to the front or should they go to Chile to haul

the nitrate without which there could be no ammunition? Should steel go to destroyers whose mission was to sink submarines or to the merchant ships the submarines had thinned to the point of breaking down of the food supplies of the Allies? Should brass go to binoculars without which cargo ships could not leave port or to shells without which they need not go at all? Should nitrate go to munitions without which guns were useless or should they go to fertilizers without which the artillerymen would be foodless? Should acetone, indispensable for British explosive, go to the powder mills or to airplanes which needed it for their wings? Should chrome steel go to indispensable army trucks or indispensable army munitions? Should women be condemned to steelless corsets or tinless preserved vegetables? Should cranes go to American wharves for loading ships for France or to French wharves for unloading the same ships? Should ships from Brazil bring coffee to bolster civilian morale or manganese for fighting steel? Should coal go to Italy to power munitions plants there or to coke here for steel for those plants? Should long-staple cotton go to tires for army trucks or to fabric for airplanes?

The wisdom of Solomon could not have infallibly decided all these questions and thousands like them — often posed by strenuous and commanding men, feverish with the excitement of the productional race against time. But they were decided — and a decision was the main thing. No error of judgment in such matters could equal no judgment. Decision gave birth to order.

It would be overstating the case to give the impression that priority always worked like a clock. When any organization gets to that point in growth where dispositions are made automatically according to a prescribed routine, it enters the red-tape period, and as yet nobody has discovered how extensive business or government can be handled without system, which is the respectful name for red-tape. It is related that a priority order once reached the Baldwin Locomotive Works several weeks after the "rush" job for which priority was therein directed had been completed and shipped. In this case the Baldwin people simply had gone ahead with a task, which their own judgment told them was of a preferred nature.

The free-and-easy methods of such a democratic body as the War Industries Board, which was always emphasizing coöperation and minimizing compulsion, made it easy for bold spirits to ignore the rules. One great manufacturer proudly told the writer that he never paid any attention to official priority. "I always got what I wanted and got it when I wanted it," he said. However, as his plants were exclusively occupied with war work, the flexible Priorities Division may have provided for this autonomous administration of priority.

Nevertheless, there were many and devious ways of beating priority, which were sometimes resorted to for the general good, and at other times for the most sordid reasons. An instance of the former was when, under a district railway embargo put on to clear up a congestion of traffic, a large munitions plant was unable to get shipment of an essential machine from a plant in another city. It found a way to beat the rules and get its machine when every effort to get a priority shipment right failed. Certain swindling jobbers of lumber made a fortune by taking advantage of automatic priority through a scheme of getting railway transportation preference under false representations.

Priority stepped on a lot of toes besides those directly banged by the preferential decisions. When demand exceeds supply, preference is in the hands of the seller and so the purchaser pays him for priority, the priority that goes to the man with the most money. Administration of priority by the Government took that element out of prices, and a lot of profiteering fortunes that were on the ways were never launched. But here priority merges into price-fixing, a topic to be dealt with in another chapter.

Notwithstanding the profound effect of priority in the direction of price-stabilization by establishing an orderly sequence of the satisfaction of demand and insuring supplies of materials to the holders of Government contracts, the dour critics who insist that the United States won the greatest war in its history by failing in every department of the war effort now contend that the Government should have followed the peace-time method of letting contracts by bids. The method actually followed was that of either negotiated or fixed

prices, with priority as a means of general coördination of industrial sequences and interrelations. Competitive bidding under war conditions with the Government as an urgent buyer of all that could be produced would have been a mockery and with such a continuous confusion of production and stimulation of prices as can hardly be conceived. Competitive bidding in such circumstances is incompatible with such an indispensable regulator as priority or with such a brake as price-fixing.

After the principle of priority had received general recognition, it became the most potent implement of industrial strategy, because with it industrial control became flexible; and industrial forces could be advanced, retired, and shifted to the flanks in the economic combat with the Germans just as surely as Foch could move his divisions and armies in the military conflict.

For example: In August, 1918, the French reported that the draft of the combined French and American armies on French 75 mm. shells was unexpectedly greater than production and that the reserves were being perilously depleted. They had fallen from 30,000,000 to 13,000,000. The Germans were on the run and then was the time to hammer them without stint. No shells were coming from America, and yet the French munitions plants were working only half-time for lack of steel. Within five days of the time that the French reported the situation to the Foreign Mission of the War Industries Board, the Mission had satisfied itself of the correctness of the French representation and cabled the Board for immediate assistance. On the sixth day, by direction of the War Industries Board, the Lackawanna Steel Company and the Carnegie Steel Company were diverted to the production of 75 mm. steel and the first shipments arrived in France within three weeks. The steel was actually arriving in France before the French Ministry of Munitions had formally placed orders for it. It came rolling into the French shell plants in such unfailing quantities that, with the ten thousand guns of the American and French batteries blazing away as never before, the French reserves went up to 19,000,000 shells.

That is priority in action. That is industrial strategy in

war. Foch's manipulation of his millions was magnificent. But suppose their caissons had been empty, as they would have been but for the industrial manipulation in America — three thousand miles away!

Anybody will tell you that no American shells were discharged in France, but nobody will tell you that but for American steel, rushed to the front in the supreme emergency, there would soon have come a time when there would have been no French shells either. It was much the same with airplanes. We did not get large numbers to France, but, if we had not rushed the supply of steel, parts, spruce, motors, and a hundred other things to the French and British factories, there would have been very little Allied flying in the last months of the war.

Let us turn to another form of industrial strategy made possible through the flexibility of manipulation of industrial facilities by means of priority. Toward the end of the war General Pershing's artillery was on the verge of quiescence because of the lack of horses and mules to drag guns and supplies over the ruined roads and across country at the front. Spain had a surplus of mules, but would not sell them. The War Industries Board, through General Dawes and the War Trade Board, found that Spain was in desperate need of ammonia sulphate as an ingredient of agricultural fertilizers, but could not import it because of the appropriation of the entire supply by the Allies for the manufacture of explosives. America itself was desperately short of ammonia sulphate, but Pershing needed those Spanish mules worse than the sulphate was needed at home, and the Spaniards needed it so much that they were willing to exchange for it the strategic mules that no gold could buy. The button of priority was touched; the embargo on the exportation of ammonia sulphate to Spain from the United States was raised; the Spaniards got their fertilizer and Pershing got his mules. Industrial strategy again.

With the establishment of the Priorities Board on the massed authority of the President and of the Navy and War Departments, the Shipping Board and the Emergency Fleet Corporation, the War Trade Board, the Fuel Administration, the Food Administration, the Allied Purchasing Commission,

such direct Congressional authority as there was for priority, and with all the authority conferred on or acquired by the War Industries Board, there came into existence the apical form of industrial control known to the United States during the war, a form which eventually applied to all industry. While its legislative authority was vague, partial, and of patches, it put all industry inescapably into the hands of the War Industries Board, for there was no appeal from the decisions of the Priorities Board except to the chairman of the War Industries Board and the President. The rents in its garment of authority were amply filled by the docile and coöperative spirit of industry. The occasional obstructor fled from the mandates of the Board only to find himself ostracized by his fellows in industry. Through the development of the principle of priority and of its administration, the long-sought coördination was attained in theory and in practice to the full degree that might have been expected in view of the early termination of the war and the defect of its placement in the general scheme mentioned above. It was the supreme implement of the direction and discipline of nationally integrated industry.

And, be it noted anticlimactically and bluntly, priority became what it was only when the President notified all of the war-working agencies that no priority order would be issued without the approval of the chairman of the War Industries Board.

CHAPTER IX

THE CONTROL OF PRICES

Public justice and price-fixing; but above all, production for war—Raw materials the heart of the problem—Forestalling the profiteer—The famous copper agreement—Checking the rising prices—Steel control—Price-regulation in a democracy—Wilson and prices—An isolated judicial body—Baruch's conception of industrial control—The mechanics of the question—Avoiding rigid policies—Sense and sentiment in prices—Judge Gary queries Judge Lovett—General results of control.

THE Government of the United States as a regulator of prices through the War Industries Board was not, contrary to popular notion, primarily the champion of the oppressed people against extortion and profiteering. The dominant object of the Board was to support the army and navy in winning the war; it was the civil side of the great engine of war. Price-regulation was an instrumentality of the paramount function of the Board. It and priority, which was at the base of clearance, curtailment, allocation, conservation, etc., were the two great implements with which the Board attained its ends.

In the beginning all use of both of these tools had for its immediate object the stimulation of production, for war uses, under whatever guise they appeared. It is true that from the first there was a motive of public justice in price-control and that, as the war went on, this motive loomed larger and larger. But, even when yielding to consideration of that motive, the Board was always thinking of production for military purposes, having in mind that the preservation of the public morale and physical health were essential to the realization of that end.

The War Industries Board had no powers, direct or indirect, to regulate prices as a matter of social justice. Vague and informal as its legal power to deal with prices was, there was in fact almost no limit to it so long as it was exercised for war purposes. Excessively high and especially unstable prices interfered with production just as much as disorder in the conduct of industry. So the War Industries Board used that instrumentality of price-control to meet that

side of the production problem, just as it did the instrumentality of priority to meet the other. The Price-Fixing Committee was in effect the paymaster-general of war industry and the Priority Board was the general manager. It was all purely a matter of doing the Government's business of the time, the great business of war.

Like many other things the War Industries Board did in the course of its growth, the function of price-regulation existed before the specialized agency thereof. The question of prices was fundamentally involved in that of voluminous production, the Raw Materials Committee of the Advisory Commission of the Council of National Defense was concerned with it from the beginning, and on April 17, 1917, the Secretary of War authorized the General Munitions Board to determine fair and just prices when asked to do so by department heads.

Raw materials were the roots of the industrial tree, and it was seen as necessary that they should be fed with prices that should be neither too high nor too low. After the raw material stage the Board merely as a successful war-making agency was little concerned in price-regulation as a fundamental thing, for, with its other forms of control grouped under priority, it could obtain its finished goods at its own prices without setting up an elaborate price-making mechanism. This is why the War Industries Board, so long as conditions permitted it to keep away from the remoter incidence of war, did not concern itself with secondary and retail prices of the products for which it fixed the primary prices. It was not, like the Food and Fuel Administrations, designed from the beginning as a protector of the public purse and the public welfare. It was primarily a war machine; the magnified supply department of the army and navy.

It should not be inferred that the War Industries Board thought of prices only as a medium of stimulating production. Even before war was declared, Mr. Baruch, as chairman of the Raw Materials Committee from which the War Industries Board inevitably grew, grasped the spiritual as well as the substantial element of the problem. A price, excessive to the point of public injustice, might stimulate the

production of the given commodity, but it would tend, he perceived, through psychologic reactions to weaken the war spirit, and thus check production in other commodities. Nothing undermines the will to war so rapidly as the popular conviction of widespread profiteering and exploitation. Also, the higher the prices, the higher the Government expenditures, the higher the taxation, and the greater and more difficult public financing, the earlier the economic exhaustion of the Nation; again, the higher the prices, the greater the inflation of currency and credit and the weaker the economic fabric.

An early motive for interfering with market prices was to disabuse the crystallizing war mind of the idea that the war was being brought on by the great industrialists for profiteering purposes. The army and the navy had immediate use for forty-five million pounds of copper in March, 1917, at which time spot copper was selling as high as thirty-seven cents a pound. Mr. Baruch, who for some months had already been familiarizing himself with the sources of the raw materials chiefly needed in war, in coöperation with Eugene Meyer, Jr., conceived the idea of appealing to the patriotism of the copper producers to make a price on this initial war order that would determine the plane of industry as an aid to Government in the coming war. The outcome of this appeal was a Government price of sixteen and two-thirds cents a pound, determined by taking the average price for ten years preceding the war.

There was little if any resistance on the part of the producers to the appeal. They knew and were told that they were setting an example that would be used against their selfish interests and those of all industry throughout the war that was impending. They were establishing the criterion by which all prices would be thereafter measured; the criterion of a price that would be in accord with public interest.

The announcement of a Government copper price fifty per cent below the market price did have a most reassuring effect on public opinion. It was not a mere dramatic gesture either. In a broad way the spirit of that copper price decision, made so freely by the copper interests, was the spirit of industry throughout the war. The writer makes this comment with the

full knowledge of large numbers of indisputable instances that may be cited to the contrary, some of which are noted in different places in this volume, and with full knowledge that corresponding to the proportion of base and noble strata in men there were thousands of sordid, selfish exploiters of the war needs of the Government and of the people. On the whole, the industrial side of the war, both in its administration by and for the Government and on the part of the manufacturers and merchants, was on a high plane of duty. There was almost no direct speculation and but little conscious profiteering at Government cost. This was due partly to the spontaneous action of producers and partly to early Government action through the War Industries Board that made the prices of the chief materials subject to what amounted to Government determination.

While the informally negotiated early copper price served to establish a precedent and a standard, it was an example rather than a precept and was in no sense automatic in its effects on other industries. It was many months before the priority principle was converted into a system, so that in the beginning of the war its stabilizing influence was not a factor in prices. Unregulated demand on an unparalleled scale was opposed to limited and disordered supply. The markets had become erratic under the effects of the tremendous buying of the Allies in the United States before we entered the war. Our exports to Europe had ascended from \$1,500,000,000 in 1914 to \$4,300,000,000 in 1917.

Price was a minor consideration with the hard-pressed Allies in dire need of supplies from America. They had thousands of buyers in the field who were eager to do business with any one who could promise delivery. Large numbers of brokers, speculators, and promoters appeared in the field and there was much wild buying and optioning. The apparent demand thus became even larger than the actual demand. Commodities were held up in their usual channels or diverted from them; all the usual and orderly processes of industry were disturbed. There was no foretelling the prices of raw materials, and huge margins of safety were added to normal profits to say nothing of opportunistic profiteering.

With its entrance into the war the United States Government added to the demand side of the already unbalanced scales the weight of eight billions of extraordinary demands in 1917 and fifteen billion dollars in 1918. Prices rose most alarmingly, not only for the Treasury and the taxpayer, but for efficient production. By July, 1917, the average price of metals was almost three and one-half times what it was in 1913, and eighty-six points above the price in March. Basic pig iron jumped from \$32.25 a ton in March to \$52.50 in July; steel plates from \$4.33 to \$9; wheat from \$1.98 to \$2.58; according to weighted index numbers foods went up twenty-five per cent in this short period.

As demand promised to become larger and larger, and as the law of supply and demand had been suspended because Government buying for war purposes had to go on regardless of the pressure of high prices, which in ordinary times create their own repression by curtailing demand, it became apparent to the authorities in Washington that the scales would have to be balanced by governmental control of some sort. The Government, as the author of the disturbing demand, could not remain indifferent to its power to deprive it of its price-inflating tendency by arbitrary action.

Pending the determination of Congress and the President to meet the price problem, the Raw Materials Committee of the Advisory Commission and the same division of the War Industries Board continued the informal price negotiations for Government requirements that had begun with copper. Its various commodity sub-committees and the supply committee and sub-committees were collecting data and generally familiarizing themselves with the situation, and through clearance, a measure of allocation, and a study of requirements were beginning to get a grip that gave them a certain control of prices without definitely and arbitrarily fixing them.

The steel producers emulated the copper men by agreeing to deliver five hundred thousand tons of steel at one third less than the market price, and the lumber committee voluntarily quoted the Government prices for lumber considerably below those of the general market. The producers of zinc and lead voluntarily made large concessions to the Government. The

union of the General Munitions Board, the Raw Materials Committee, and the Supply Committee of the Advisory Commission, to form the War Industries Board, just at the time that the price problem was becoming insistent, gave a concentration of the industrial side of the Council of National Defense, theretofore lacking, that enhanced its capacity to deal with prices as well as with other phases of the Government's economic problem.

The concentrating of the allocation of Government and Allied purchases through the Commodity and Supply Committees took much of the uncertainty, and, therefore, the inflation, out of business so far as Government orders were concerned. In fact almost everything the War Industries Board did had an effect on prices. Nevertheless, it became more and more evident that there must be some sort of direct control of a more drastic nature.

Although the steel people had given the Government a marked price concession early in the war, the steel market continued to be a "runaway" one; coal and coke and many other things were on a rampage. The chairman of the Shipping Board threatened to commandeer steel mills if prices were not aligned with the results of a cost investigation then under way by the Federal Trade Commission; the Secretary of War declared that the prices of steel and iron must be controlled; the Secretary of the Navy declared that the Government would not pay exorbitant prices for steel; and the President, on July 12, 1917, warned industry that there must be a "just price," that law "must of course command these things," and declared that the Government was about to attempt to determine prices. The President also laid down the rule that prices for the Government must be the same as for the public, for "prices mean the same everywhere now; they mean the efficiency of the Nation, whether it is the Government that pays them or not; they mean victory or defeat."

Steel is as all-powerful in war as in peace. It is the basis of the basic raw materials. Control its price, and you automatically control a host of prices. It was but natural that it should be the subject of the first formal price-control. The industry itself, at first opposed to control, came later to believe it to be necessary. All through the middle and late

summer of 1917 the War Industries Board studied the ways and means of steel control, and the passage of the Food and Fuel Act in August, which specifically gave the President the right to "requisition foods, feeds, fuels, *and other supplies* necessary to the support of the army or the maintenance of the navy, *or any other public use connected with the common defense*," certainly strengthened and broadened the requisitioning phase of the Executive's war powers. It did not authorize price-control, but it made it easier; and, after all, there is but a nice and unnecessary distinction between taking ruthlessly and taking at a price. The latter is certainly a derivative right from the former.

Added to the commandeering powers already conferred on the War and Navy Departments and on the Shipping Board, the men of action who were in command of the war machine considered that they had enough authority for their purposes even if Congress did still hesitate to create a price-control as such. As Congress left the situation, it was susceptible to a flexibility and adjustability of control that might have been absent under a law of prescription. The reluctance of Congress and even of the Executive to plunge into arbitrary price-control is now seen to be wisdom, even if it were the wisdom of indecision. The democratic spirit of the Nation held it back from written expressions of the firm control that was more or less inevitable; the stubborn conviction of the masses that Government must not meddle with private affairs except in extremes restrained the Government from arbitrary methods even when the most sweeping powers were exercised.

The outcome was that virtually all Government measures that entrenched upon fields ordinarily left entirely to private effort were approved by the unwritten will of the people, and such articulate form as the measures did take were looked upon as aimed at the refractory minority rather than as an imposition of something detestable upon the majority. No good citizen resents a law of homicide, because he feels that he is quite outside its field. It is the law he himself would make to control the criminally inclined. The grand result of the whole gradual and "by consent" way in which the Government took its economic measures, though it veiled for

a time the stern and rude side of war from the popular consciousness, was such an enthusiastic, voluntary participation of the masses in the war enterprise as was, perhaps, unknown in the other great nations involved in the World War.

In the case of steel, the record shows that from a rather unyielding and even grasping attitude at first the steel producers gradually softened and relaxed and came to take the public view. In the end there was not the sullen compliance that would have followed arbitrary action, but the cheerful and earnest coöperation of partners dominated by reasonableness. Before the final step was taken, there was much coming and going from Washington and numbers of voluble and indecisive conferences. The basic prices of coke, steel, and iron were established at a conference of the War Industries Board with sixty-five representative iron and steel producers on September 21st, though not promulgated by the President until September 24th.¹ The copper price was also fixed on the former date. Although it was not the direct concern of the War Industries Board, coal being under control of the newly established Fuel Administration, it is noteworthy that the price of coal was fixed a month earlier.²

Before the establishment of the Price-Fixing Committee in March, 1918, the War Industries Board itself had dealt initiatively or conclusively with prices for hides and skins, wool, munitions, linters, harness leather, sulphuric acid, nitric acid, cotton textiles, cotton linters, sand and gravel, manila fiber, building tile, sole and belting leather, rags, wool grease, compressing rates for cotton, brick, millwork, gypsum wall board, cement, various sorts of lumber, zinc and aluminum, in addition to copper, iron, and steel. The Board proper retained its informal control of lead, wood chemicals, nitrate of soda, alkalis, nickel, quicksilver, platinum, cotton textiles, cotton linters, wool, hides, skins, and leather, manila fiber and hemp, burlap, lumber, building materials, and chemicals. The reason of this retention was that, in the cases of these materials, there were involved so intimately other functions of the Board with which price-

¹See Chapter XVIII, "Steel: An Epic of the War."

²The Fuel Administration left the price of coke to the War Industries Board.

fixing was mixed that it was not practicable to surrender price-fixing to the committee. Particulars of the price-fixing of different commodities including steel and iron will be dealt with in later chapters.

The establishment of prices was such a delicate matter and so charged with explosive possibilities that it was always a matter for presidential analysis and approval. As time went on, and it became necessary to take control over more and more commodities in which shortages developed, and as the control of prices of finished products began to loom, the price-fixing function became such a burden, in addition to its delicacy and complexity, that the necessity arose for the creation of a new agency for its administration. Price-fixing was a judicial function, which seemed to require a certain detachment from the administrative functions of the Board.

It is true that priority, which in the last analysis was the principle which controlled all the other functional divisions of the War Industries Board, affected prices and that prices reacted on the administration of priority; but between price-fixing and the other functions of the Board there was such a sharp distinction as was to be found nowhere else in an organization which was remarkable for its lack of hard-and-fast boundaries between departments. This difference, indeed, was almost generic and led in the final reorganization of the War Industries Board to a curious division of the Price-Fixing Committee from the Board proper, even in authority.

On the recommendation of Mr. Baruch, prior to his appointment to the chairmanship of the Board, the Price-Fixing Committee was named by the President and not by the chairman of the Board. It was the only part of the Board in which the chairman was not independent of committee action. The President enjoined him in the determination of prices to be governed by the advice of a committee "constituted for the purpose," which should include, besides himself, "members of the Board immediately charged with the study of raw materials and of manufactured products, of the Labor member of the Board, of the chairman of the Federal Trade Commission, the chairman of the Tariff Commission, and the Fuel Administrator."

While the committee was to determine prices for the chairman of the Board, it really reported them directly to the President, who always passed on them before they were promulgated. Nevertheless, the Board defined the functions¹ of the committee, which always acted, not of its own initiative, but at the instance of the Board or some department of it.

It was distinctly a committee of the Board, and yet only three of its members were members of the Board itself; at the same time the committee, in its function of determining prices, was absolutely independent of the Board and was responsible directly to the President. The initiative in price-control lay with the Board, but in determining prices or policies the committee acted as an isolated judicial body, divorced by its composition from a suspicion of bias, absolutely independent of administrative control and the partialities or antagonisms that might arise therefrom.

Prior to the final separation of the War Industries Board from the Council of National Defense, the latter body issued a statement regarding the purpose of the Price-Fixing Committee, in which it described the committee as being quasi-judicial and separate and "made up of men separated so completely from industrial interests that their motives and actions in the determination of prices can be subject to no suspicion of mercenary interest."

Chairman Robert S. Brookings, who had previously been at the head of the Finished Products Division of the Board, Chairman Baruch of the Board, and Henry C. Stuart (former governor of Virginia), who was on the committee as the representative of the public interest as contrasted with the specialized war interest of other members, were the only members who could be classed as business men who might have a remote personal interest in prices (although all three were strictly disassociated with active business).

¹When the committee was called together by the War Industries Board, its functions were outlined as follows: "(1) to advise upon prices of basic materials; (2) from time to time to advise as to general price policies, acting in this way as a coordinating price body; (3) the committee will advise when requested by any department upon a specific contract, assuming, however, that no department will submit for advice those problems which it is organized and qualified to handle itself; and (4) when materials are commandeered prices of the same will be fixed by this committee."

But, even if their views on prices had been tinged by remote particular interests, they would have been outvoted in a committee of nine members, the other six of whom were Hugh Frayne, representative of Labor and at the head of the Labor Division of the Board; F. W. Taussig, chairman of the United States Tariff Commission; W. B. Colver, chairman of the Federal Trade Commission; Dr. Harry A. Garfield, United States Fuel Administrator; Commander John M. Hancock, representing the navy; and Lieutenant-Colonel Robert H. Montgomery, representing the War Department.

The Price-Fixing Committee bore about the same relation to the War Industries Board as the Federal judiciary does to the Federal Government as a whole: certainly the Supreme Court, for example, is a part of that Government, and yet it is in a position to oppose both the executive and the legislative arms. The Supreme Court supposedly promotes the policies of the Government by keeping it true to the Constitution, the organic governmental programme. The Price-Fixing Committee was designed to determine, without influence of persons or interests, prices that would conform to the success of the function of the War Industries Board — which was to obtain and maintain adequate production in support of the army and navy. The specialization of price-fixing in a department of its own made the function a continuous one; the committee was continuously at work and ready to pass on any question that might be referred to it; so that price-fixing became a process rather than a series of incidents.

It is conceivable that a body which was a part and instrument of the War Industries Board, both in its membership and in its administration, and yet largely autonomous, might have been a source of friction. For instance, the Board might have considered a certain price policy necessary to the success of its work, whereas the committee might have favored another. In fact, there was no friction for the same reason that the Board worked without friction between any of its departments, which was the coöperative attitude of the whole personnel. Consecrated to a common purpose, the members rose above personal ambitions and pride.

In prices as in much else of its work the War Industries Board avoided the creation of rigid policies. Mr. Baruch always had the conception of industrial control as analogous to military strategy, and he consistently opposed the establishment of policies that might hamper action in the face of an emergency. The Board never considered its acts in any case as precedents for others; it kept itself in a fluid state.

There was necessarily, however, a general method of dealing with prices. Prices might have been dealt with in three ways, namely, leaving them to the open market—supply and demand; the establishment of a fixed rate of profit; and the setting of a fixed price. The first was obviously impossible if there was to be any effective control of industry when the demand, being largely the imperative war demand of the Government and of the Allies, was not subject to reduction by a rise in prices, as is the case with demand in ordinary times. The adoption of that policy would simply have meant, in the circumstances, that the source of the demand that was sending prices upward, and would continue to do so, would have left price-fixing entirely to the sellers. It would have been to give governmental sanction to unmitigated profiteering.

Even before there was any definite thought of price-fixing as a policy, the open-market plan was adopted when the peace-time policy of letting contracts by bids was suspended at the very beginning of the war. Thereafter Government purchases were chiefly through negotiated prices, which involved from the start an element of Government price-fixing, which became more and more important as the offices of the Council of National Defense, General Munitions Board, and War Industries Board were invoked. These bodies always exerted an influence on prices that tended to suspend the free operation of the law of supply and demand and that limited profits. They were not concerned, it is true, with getting the lowest possible prices; but with the establishment of prices that would stimulate production without being intolerable in amount.

In some instances, as in shipbuilding, cantonments, aircraft, etc., the Government did adopt the policy of fixing prices by fixing profits, which was, under another name, the

cost-plus policy. With certain products it seemed to be the only feasible one; actual Government possession and operation of manufacturing plants would have been only a form of cost-plus, because the owners of the plants would have been entitled to a compensation which would have to be determined sooner or later.

It was a policy with manifest defects. It involved the maintenance of enormous and costly accountancy systems by the Government in order to determine just what the cost of production was; endless disputes concerning the calculation of costs; a premium on inefficiency, because the more efficient a producer was, the lower his costs and the less his absolute profits (although ingenious devices were adopted to counterbalance this tendency). To have applied it to all Government purchases would have called for an army of accountants almost as large as the army in France.

The third policy, and the one followed by the War Industries Board, was peculiarly susceptible of application to raw materials, which were the chief concern of that Board, because with them it was a comparatively easy matter to determine production costs in advance. Having obtained these for both high-cost and low-cost producers, the Board in conference with the producers fixed a price that would give a reasonably stimulative profit to the low-cost men. It was the business of the Board to stimulate production in all lines in which there was a shortage — not to haggle for the lowest possible price for a given order. A reasonable price was important, but volume production was the imperative consideration.

It should not be inferred from this that the Board was reckless as to prices. There was a view that the Board did not need to be too careful of prices because the war and excess profits taxes would automatically return to the Treasury the major part of large profits. The Board did not share it, however, because it looked to the economic effects of extravagant prices and profits — mounting wages, high retail prices, labor unrest, credit inflation, etc. The Board did consider, though, that while prices that would insure a profit to four fifths or nine tenths of an industry — which seems to have been the bulk-line fractions it had in

mind — would mean very large profits to the low-cost producers, a large portion of their profits would come back to the Government in taxes.

It cannot be denied that the horizontal-price plan applied on the plane of high-cost production was a tremendous invigorator of big business and hard on small business. The large and efficient producers made larger profits than normally and many of the smaller concerns fell below their customary returns. On the other hand, if prices had been fixed on the plane of low-cost production, many, if not all, of the smaller concerns would have been driven out of Government business, which meant for a time at least from all business, with a resultant loss of their potential production and the withdrawal of the premium on maximum production from the large producers.

In view of the general dissatisfaction that was expressed with the cost-plus system, few would have the hardihood to say now that it should have been adopted generally. The level-price plan accorded admirably with the general policy of the Board — of getting results instead of concerning itself with the details of methods. Industry was left to its own management and devices in extending itself to the maximum and was not hampered with a swarm of critical supervisors and accountants. In this way the genius of American business was not cramped, but utilized to the fullest extent for the purposes of war. The discussion concerning the basis of fixed prices was long and of absorbing interest. Professor Taussig, a member of the Price-Fixing Committee, presented the argument for a uniform price as follows:

1. If differences in cost of production between different producers were —

- (a) Clearly ascertainable;
- (b) Due solely to differences in the natural resources utilized by them;

it would not be impracticable to purchase from them at prices based on their differing costs.

As a matter of fact, neither of these conditions is ever present. In the first place, costs are not clearly ascertainable. They vary from month to month, from year to year. We get figures from cost accountants which are worked out to the last cent, but which,

as a matter of fact, contain arbitrary and debatable elements. Any endeavor to pay to each producer according to his costs would lead to perpetual wrangling, perpetual requests for changes and modifications. In the second place, differences in cost are by no means due solely to differences in natural resources. They arise very largely from differences in skill, energy, efficiency. To pay a low price to a producer who has brought down his costs through skill and ability is to penalize the most effective form of human effort.

2. Sale at varying prices is in any case not practicable. If the Government fixes a price, it must be a price uniform for all producers. Were this not the case, there would be constant squabbling and intriguing for favored position.

3. The main problem is that of purchase, and I am unable to see the practicability, as conditions of production stand to-day, of carrying out a policy of purchase at varying prices. The only possible way of carrying it out would be for the Government to take over all the establishments and try to run them. Quite apart from the constitutional questions involved (as regards the fair price which the Government must pay for each plant) the actual administration and running of an enormous variety of plants would be a hopeless task.

4. The only feasible plan in price-fixing is that of establishing a uniform price, which should ordinarily be paid for the whole of the output.

The uniform price which the Government thus must fix is not necessarily the cost-of-production price. It need not be either an average cost-of-production price or a marginal or "bulk-line" cost. The Government might be expected under ordinary conditions to pay the market price that would obtain in the absence of regulation, irrespective of cost. Under conditions of war stress and war exigency, however, the Government must pay for an essential commodity that price which will maintain and, if possible, stimulate the volume of production. Such a stimulating price is not far from the marginal or "bulk-line" cost.

There will always be sporadic producers having very high costs, higher than the "bulk-line," who may be disregarded. It is conceivable that in extreme need for a particular commodity the Government will make some special bargain with the small number of high-cost producers. But such transactions are extremely dubious and are to be avoided except in the extremest urgency. As regards them, it must be made out that the very high cost of the producers is not due to slackness or inefficiency on their part, but to poor natural resources, and that the payment is indispensable for the maintenance of a supply absolutely needed.

At the same time the fixed price stimulated efficiency and consequently production, because the larger the volume of production in proportion to cost, the larger the profit, even after making allowance for taxes.

It does not appear that there was any customary percentage of profit estimated. The whole price-fixing theory was based upon the fact that the price must be put at the lowest possible figure at which we could obtain all the things that were needed for the prosecution of the war.

The earlier policy of the Board as a price-fixing medium was also the policy of the Price-Fixing Committee. Time and again Chairman Brookings made it plain that his committee had no rigid policy beyond that of making the costs of the less efficient section of an industry the basis of the price for all. Here it must be remembered that the Board primarily dealt only with materials in which there was a shortage and in which, therefore, production must be increased. Unlike the Food and Fuel Administrations, the War Industries Board was not fundamentally concerned with retail prices. The course of events was turning it in that direction as the war approached its end, but its chief purpose was to secure the materials the Government or the war industries needed at a price that would stimulate production without being excessive.

However, the Board did always provide that the raw materials prices obtained for the Government should also be enjoyed by the public and the Allies. Thus, the original producers could not practice extortion on the public, but the secondary producers—the makers of finished goods—were not so restrained. When retail prices began to get so high as to react on production, through disturbance of the public mind, the unsettling of wage scales and concomitant industrial disturbances, they did become the concern of the Board, and only the early termination of hostilities prevented a régime of price-fixing for the protection of the ultimate consumer, comparable to that of the Food and Fuel Administrations, but probably on a fixed-maximum-price basis instead of on the basis of regulation of profits.

The War Industries Board's conception of price-control leaned toward stabilization as the chief consideration. This

it obtained in the completely controlled industries through price-fixing and in the partly controlled through the application of the principle of priority. "War prices were high prices," writes Mr. Baruch in his preliminary report on the work of the Board, "but they were stabilized prices. The most effective organ of stabilization was the operation of the priorities system." Priority took away from the market the element of price-determination that arises from knowledge of insufficient supply of raw materials; price-making deprived the market of the element that proceeds from the desire for inordinate profits.

Quite aside from the matter of profiteering, unnecessary burden on the taxpayers, and social justice, the War Industries Board sought stabilization as a *sine qua non* of maximum production. Production to it was as ammunition to the soldier. At the risk of unnecessary repetition, it is essential to state that the War Industries Board was the civilian complement of the armed forces of the Nation. Its business was the basic procurement of the goods needed for war consumption; not to safeguard the civilian against want and extortion as were the Food and Fuel Administrations in large degree. When it acted to protect production for the public, as it did at times — and was coming more and more to do — it was still with its eye on the objective of production. It took care not to kill the goose of the golden eggs whilst stimulating the output of eggs; but the goose was conserved, not for her own sake, but for that of the eggs. As the Shipping Board's incessant clamor was for ships and more ships, the War Industries Board's insistent urge was for production, production, production. This may seem somewhat cold-blooded, but it was not; it was simply fidelity to function. A general will save all the lives he can; but however humane he may be, and as such gratified by a small casualty list, he is sparing of his men in his capacity as a general only that he may have more to spend at another time.

In this making of the Government price the common price the Board was moved by both sentiment and sense. It was obviously not the fair thing to leave producers free to squeeze the public to make up for any slenderness of

profits under Government contracts, and it was not in accordance with the ethics of partnership to allow the Allies to be assailed by excessive prices behind the lines while we were fighting for and with them at the front. The Allies were spending in this country money loaned to them by the National Treasury; the higher the prices exacted of them, the greater the loans, and the greater the ultimate burden of the American people.

Price-fixing by the War Industries Board was not an arbitrarily proclaimed or abruptly determined process. It always took the form of negotiation, and the results were, strictly speaking, agreed rather than decreed prices. It is true that in some instances the Board had to show its teeth and force fair prices by threats of commandeering,¹ but the method of approach was always one of mutual consideration.

On the historic occasion when the sixty-five delegates of the steel industry met the Board in full session to determine steel prices, Judge Elbert H. Gary, speaking for his associates, solemnly inquired of Judge Lovett, of the Board, as a lawyer:

"May I ask by what authority the War Industries Board has undertaken to fix these prices?"

"A gentleman of your eminent qualifications in law," was Judge Lovett's answer, after a moment of profound silence, "requires no information from me on that point."

And with a grim smile all around, the Board and the delegation proceeded to fight it out. It was no parlor debate, either. The Board was armed with facts and figures about steel and iron production and costs, not only from the exhaustive investigations of the Federal Trade Commission, but from the inside information of Replogle and other steel men who were now playing the Government's game.

In lumber and other commodities as well there were some very tense sessions in connection with price-fixing, but the war service committees and other representatives of industry had the satisfaction that every good fighter has in meeting a foeman worthy of his steel. On the foundation of its commodity sections and divisions, the War Industries Board

¹Commandeering was actually resorted to by the army and navy in many cases. The army alone issued 510 requisitions for goods and 996 compulsory orders for production of goods.

built up a skillfully used knowledge of everything it undertook to do. Business men used to complain of "professors" in other Government agencies, but in the War Industries Board they dealt with their own kind. The fidelity of the transplanted business man to the Government was remarkable and stirring. He played the game just as strenuously and remorselessly for the Government as he would have played it on the other side. It is a singular fact, too, that the very men on that other side were sometimes furious at their brethren in the Government's service for doing precisely what they would have done had they been on that side.

When a price for any commodity had been determined by the War Industries Board, it did not follow that Government purchasing agencies were not free to obtain better prices if they chose to; the Board price was always a *maximum price*. In general, though, it was accepted as the established price, and that part of contract-making did not bother the buyers any more. Occasionally a price was fixed only for a limited purpose or for one department, and sometimes for the benefit of the Government or for the Allies only; but in general a price once made was a price for all. Note that prices were fixed every three months, to insure fair play to producers and justice for the general public. At all times the Price-Fixing Committee was open to complaints or suggestions from Federal departments, the public, and Congress. This seems to have been forgotten, particularly by a few Congressmen who complained after the event.

The creative and research work of the Price-Fixing Committee was vastly simplified, not only by its intimate relations with other parts of the War Industries Board — particularly the commodity sections — but by the assistance of the Federal Trade Commission. This imposed a heavy burden on the Commission and made it in large measure an adjunct of the War Industries Board. Some five or six hundred persons were employed by the Commission in its work of investigating costs as related to the war effort.

The administration of fixed prices was left to the commodity sections of the Board, which also, it should be noted, were constantly tied in to the process of price-making. The details of aligning the prices of particular products in

accordance with basic prices were usually left to the industrial associations or war service committees as a matter of trade routine based on accepted differentials.

In the beginning important legal aspects presented themselves. Excellent authorities held that, in contemplating fair prices to producers, the prices prevailing before we entered the war would have to be considered. In some cases these were one hundred per cent higher than those finally paid. The prices finally agreed upon were voluntarily arrived at and the mounting legal aspect thus eliminated. The Government consequently avoided the higher prices that legal action might well have caused.

The general results of the price-fixing work of the War Industries Board were satisfactory. Together with the price-controlling of the Food and Fuel Administrations they did effectually check the runaway market of the summer and fall of 1917, and kept prices under restraint until control was released. It has been pointed out that because the War Industries Board (with the notable exception of cotton) confined its price-controls to raw materials, there was a wide opportunity for profiteering in prices to the final consumer. This opportunity was undoubtedly used, too, but price records show a gratifying response on the whole of prices of finished products to those of raw materials. It was in the final step from the retailer to the private consumer that there was the greatest departure from proportion. The Government and the Allies, as buyers, got the benefit all along the line from the stabilization of original producers' prices. Had it not been for the primary control, however, with its rationalizing and steadying influence, retail prices would certainly have been much more erratic and probably on a far higher average plane than they were.

The departure from the rule in the case of cotton, a most important raw material and the only one of the great raw materials that was not priced at the source, has been the occasion of much controversy. To fix the price of cotton meant dealing with millions of producers — the cotton farmers — which was an undertaking foreign to the Board's habit of establishing prices quietly through conferences with a few men who were able to speak for industrial groups.

It would not have been a matter of the council room, but of debate in the national forum.

Congress had fixed prices for all wheat produced, but had not touched corn and had refused to deal with cotton prices. It was a question whether the Board had justification for entering a field that had thus been preëmpted by Congress, though President Wilson stood ready to support it. Finally, though there was at times a shortage of the better grades of cotton, there was never a general shortage, which fact left raw cotton outside the Board's defined field. It is true that exhaustive consideration was given to the question of stabilizing the price for raw cotton and that price-fixing at the source was considered. A special committee appointed to consider the raw-cotton problem advised against price-fixing, as being unnecessary and capable of application only by Government purchase of the entire crop.

As an administrative machine the War Industries Board's practice of dealing with prices at the source had the great advantage of simplicity. There was no necessity for an enormous policing and administrative force to watch and supervise hundreds of thousands of establishments. The few thousands of industries located at the source of the controlled materials were so grouped together by association or committees that they effectually policed themselves, and their operations were so conspicuous that any glaring evasion or violation of regulations for any length of time was impossible. The whole personnel of the War Industries Board at its height did not exceed fifteen hundred persons. Yet, with this small force, order, reason, and restraint were introduced into purchases for the Government and the Allies that aggregated thirty billions of dollars in value and that ramified throughout the teeming industrial life of America, touched the business life of the whole neutral world, and even of the Allies themselves, and imbued the huge economic mechanism of America with potent efficiency.

CHAPTER X

BALANCING SUPPLY AND DEMAND

The twilight zone between essential and non-essential industries—Looking beyond the war—Jewelry and automobiles—An industrial operating clinic—What happened to the building trade—Baruch writes Mayor Hylan—Politics adjourned—Rifles, artillery, gun mounts—Ferretting out hoarded goods—Housing fifty army divisions—The Board and the railways—Breaking a great transportation jam—The searchlight of statistics—The War Trade Board ties in—The legal factor.

A SIMPLE analysis of the elementary functions of the War Industries Board would be to say that they consisted of the stimulation of production and the conservation of products. We have seen in previous chapters how the task was outlined through the study of requirements and resources, and how it was attacked through the two implements of priority and price-fixing, both of which were primarily used for obtaining increased production of the things that were essential to the successful conduct of the war and the maintenance of the sanity and vigor of the people.

In the judgment of the writer the principle of priority in the broadest sense was the underlying principle of all the work of the Board except that of price-fixing. We are not speaking now merely of the Board's Priorities Division, but of the principle of priority—the ordering of the fulfillment of requirements to correspond with the volume of supply or resources.

To meet the demands of priority, it was necessary to take direct administrative measures to increase production and restrict use. The organic functional units through which these ends were attained were the Conservation Division and certain other restrictive instrumentalities, on the one hand, and certain agencies for the expansion of supply, on the other hand. These last, as already noted in Chapter VIII, included the Resources and Conversion Section, the Facilities Division, the Advisory Committee on Plants and Munitions, and the Division of Planning and Statistics. The two first-named agencies were placed administratively in the

Division of Finished Products under the Commissioner of Finished Products, the third was placed under Mr. Alexander Legge, and the fourth was independent, reporting directly to the chairman, but being intimately associated with the Conservation Division.

Actually, there were other functional agencies that were specifically created to increase production, conserve products, or curtail consumption. One of these was the Non-War Construction Section which was placed directly under the Priorities Commission, as was another, the Industrial Adjustments Committee. Another was the Fire Prevention Section in Mr. Peek's administrative division; still another was the Stored Materials Section under Mr. Legge; and also the Inland Traffic and Emergency Construction Sections of Mr. Legge's administrative sector of the Board. Some of the so-called commodity sections had such specialized functions in relation to the stimulation of production in general as to be more properly classed with the agencies just mentioned than as media of contact with particular industries. Of course, it is not to be forgotten that the commodity sections were almost always the point of direct application of the functional activities under whatever administrative divisions or whatever guise. Quite outside of the administrative authority of the Board was the augmentation of supply through the expansion of imports and the restriction of exports through the coöperation of the War Trade Board.

It is the purpose of this chapter to deal with these special instrumentalities of balancing supply and demand except the Conservation and Resources and Plants Divisions, each of which will require a separate chapter.

The application of the principle of priority with all its corollaries quickly raised the sore question of non-essential industries. It was apparent that, under the preferential system of access to materials and facilities, some of the industries not engaged in actual production of commodities for war utilization would be restricted to the vanishing point. But beyond the inevitable evolution in that direction there was an insistent demand for the arbitrary excision of "non-essential" industries at a single operation.

Viewing, on the one hand, the need of men for the armies, and of equipment for them in its myriad forms which made demands upon the productive capacity of the country that in some lines were more than equal to the annual output, and, on the other hand, a host of luxurious or decorative industries which were holding men and consuming materials, there was an impulsive demand of great intensity and determination for the virtual scrapping of many industries. With this extreme view the War Industries Board did not agree. It was prepared to strip the fighting Nation to the waist, and was willing to decree the suspension or even the ruin of any industry if that were the price of victory, but it saw that there was no dividing line between essential and non-essential industries — only a twilight zone that reached at points to the other sides of the main zones. The Board was not prepared to single out the sheep from the goats by an omnibus proscription. It preferred to leave the elimination to a process of natural selection through the progressive operation of priority. It perceived that the morale of the people was deeply involved, and it saw that psychological reactions cannot be easily foretold. It saw also that to extinguish an industry, even if its product were a patent superfluity, was to cripple the industrial body, which had to be kept sound and strong, even if lean and stringy, unless the facilities and persons involved could be immediately applied to other tasks that would keep them in the industrial fabric.

Then, too, beyond the moment was the question of the future. All wars come to an end, and it is desirable to have something left of what was worth fighting for. The victors in some wars have been the victims of the following peace. The doughboys would not have gone very cheerfully to the front if they had thought that they were to return to an impoverished and disorganized homeland. Certainly there was no occasion for a dramatic sacrificial gesture that would mean the sweeping away of scores of industries, the disemployment of hundreds of thousands, widespread bitterness, and impairment of the will to war, as was urged by the extreme "forgodsakers," to whom every soda fountain, ice-cream parlor, jewelry shop, candy store, automobile pleasure car agency, theater, movie-house, pie bakery, etc., was an offense.

Nevertheless, there came a time when some industries, even highly useful and fundamental ones, if they happened to deal with its deferrable needs, had to face virtual suspension. They were left, it is true, with skeletons on which the flesh of activity might be regrown, but they were very ghastly skeletons in the eyes of the proprietors. In the great majority of cases the application of the policy of conversion found places for plants and personnel in work that could not be deferred. In scarcely a case was any industry except that of alcoholic beverages¹ branded as non-essential, and that was the work of Congress, though the Board had caused the largest whiskey distilleries to be converted to the manufacture of alcohol for utilization in making smokeless powder. The War Industries Board rather inclined to the view that in the true perspective there were no non-essential industries, only many grades of relative immediate utility.

The crusade against non-essential industries became so insistent, and so many people felt that the tapering-off policy of the War Industries Board was so unheroic and even timid in view of the universal tragedy of the war, that President Wilson designated the chairmen of the War Trade Board and of the War Industries Board and the Food and Fuel Administrators to consider and decide what, if any, industries were non-essential and should be sacrificed in order to stimulate indispensable production by the diversion to it of labor and materials. This committee appointed a working committee, composed of Clarence M. Woolley, of the War Trade Board, as chairman; Edwin B. Parker, Priorities Commissioner; T. F. Marsh, of the Food Administration; Edwin F. Gay, of the Shipping Board; P. B. Noyes, of the Fuel Administration; Felix Frankfurter, chairman of the War Labor Policies Board; and George May, of the Treasury Department. This second committee finally reported to the President that in its opinion no industry should be prohibited or destroyed, and that, instead, there should be a general curtailment plan that would do away with the conflict between

¹The suspension of the manufacture of intoxicants was by an act of Congress, but before the national legislature had decreed full war-time prohibition the committee of investigation had recommended that the brewing industry, which was still legal, should be curtailed to fifty per cent of its normal barrelage, the committee holding that summary prohibition by administrative action would have an untoward effect.

war and non-war industries in the matters of materials, labor, fuel, and transportation.

Out of the long list of American industries, the committee reported that "a searching analysis revealed only twenty-five classes as purely non-war industries and therefore worthy of consideration for complete prohibition." The capital invested in these industries was \$733,000,000, the number of employees 283,518, and the annual fuel consumption 1,701,000 tons. In part the committee's inescapable conclusion was as follows:

Contrasting the degree of relief afforded with the hardships necessarily imposed upon a part of the community, your committee has reached the conclusion that it would be inadvisable to adopt direct industrial prohibition to accomplish the desired end. It would not only result in inequalities and thus engender intense dissatisfaction on the part of those affected, but it would also create grave apprehension throughout the entire industrial community. This might weaken the morale of the Nation and, in the final analysis, cause actual harm rather than positive benefit.

We also invite your attention to the fact that a sudden dislocation through complete prohibition of any industry involves the disintegration of entire organizations, including the workers, foremen, superintendents, and managers. Such organizations in most cases are the cumulative result of many years of constructive effort, and it is obvious that with the ending of the war the prohibited industries would be obliged to go through the pioneer process of re-creation. This would, in the opinion of your committee, augment the embarrassment of post-war industrial readjustments.

The sub-committee which made the report on non-essential industries, and found, in effect, that there were none, was constituted a permanent body as the Industrial Adjustment Committee of the Priorities Board, with Rhodes S. Baker, Assistant Priorities Commissioner, as its executive officer. This committee gave constant consideration to forecasting the effects of the extension of the rule of priority. As each additional industry was found to be a proper subject of curtailment, ample advance notice of the Priority Division's plan was given to its members, and they were accorded the fullest opportunity to oppose the curtailment programme or to coöperate in its determination. The basic policy of the

committee was to outlaw no industry as non-essential and to seek to leave enough of each so that its resumption of activity at the end of the war would be expansion instead of reconstruction. At the same time the curtailment process released men and materials for the currently indispensable industries so gradually that there was no shock to the economic body.

The committee's report threw light on some of the untoward results that would have followed the adoption of the view of the absolute non-essentiality of certain industries. Offhand, one of the most palpably non-essential industries in war-time is the manufacture of jewelry. But certain cities actually live on that industry. Would it be promoting the winning of the war to wipe the city of Attleboro off the industrial map and make its inhabitants a public charge? Moreover, jewelry as an article of export had an important bearing in balancing exports and imports and in maintaining exchange at a parity, at a time when exports were of great importance as a means of obtaining necessary imports. A nation must live if it is to fight, and in the economic, as in the human, body there are obscure and seemingly superfluous organs, the removal of which upsets the whole of the bodily processes.

The committee might have added that the prevalence of some luxuries is the surest incentive to labor. Many an alien laborer did good service in the war — not from patriotism, but because of the lure of diamonds, silk shirts, and phonographs. Ice-cream and candy look like dispensable luxuries when men are dying for lack of shell steel, but the driven worker in the roaring bays of factories is but human, and even in war-time he cannot be a Jack-of-all-work-and-no-play.

The Industrial Adjustment Committee had a stormy career. It was essentially a trouble committee. Around it raged the storms of torn and shorn business, shot through with lightning flashes of selfish anger and dark with apprehension and misgivings. To it came American business as a fearful patient to the operating-room. One of the most difficult of its patients was the passenger automobile business, which was finally cut down to a twenty-five per cent basis, but that is chiefly a story of steel and iron curtailment and will be told in the chapter on those commodities.

The most heroic operation was performed on the building industry. Priorities Circular No. 21 was all but a death-blow for it. It, as supplemented, decreed that except by special permit no new non-war building construction should be undertaken involving an expenditure of more than five hundred dollars and no extensions costing over twenty-five hundred dollars. The administration of this Draconian ordinance was entrusted to a Non-War Construction Section, under the Priorities Commissioner, headed by Mr. D. R. McLennan.

Circular No. 21 was a painful and staggering blow, not only to the building trades, but to all the industries from which they drew their materials. It fell upon the plumbers, the carpenters, the steam-fitters, the lumber manufacturers, the cement men, the furniture makers, and numberless other industries. And it made trouble for every citizen who wished to build or enlarge a home or a business structure. It was a hard blow, and the reaction was instantaneous and indignant. It came from all parts of the country and from every rank of life. It rolled up to Washington in a cyclonic storm of protest to the War Industries Board and to Congress. It was a fierce storm, but it was resisted with patience and ingenuity.

In an inspired moment it had been suggested that the Non-War Construction Section operate through the State Councils of Defense and their local bodies. The writer so warmly approved of this course that as director of the Council of National Defense and as the active head of the Council's great Field Division that guided and coördinated the work of the 184,000 units of the State and local councils of defense, he agreed to the Board's establishing direct contact with the State bodies. To avoid overlapping war effort in the States, this had not been done before.

Here, however, the short cut was imperative. To get a building permit from the Section the would-be builder had to have his project approved by his fellow townsmen before his application could be considered at Washington. Those fellow townsmen had sons and brothers in the trenches or on their way to them. It had to be a very necessitous enterprise that would persuade them to divert labor and materials that might be used directly to help the fighting line. They did

their duty without fear or favor, these local Councils of Defense, and the would-be builders had to make their fight at Washington.

The Priorities Commissioner and the War Industries Board were in a state of siege, but they stood firm and defended themselves before the high court of Congress when a Senate resolution, introduced by Senator Calder, of New York, called upon the Board to explain why a four-billion dollar industry, "than which it seems to me there can be few more essential," should be condemned to quiescence. Chairman Baruch's answer pointed out that, as against a semi-annual war demand of twenty-one million tons of iron and steel, the product was but seventeen million tons; that in the face of a shortage of fuel for carrying out the war programme the production of building materials was consuming thirty million tons of coal, and that twenty-five per cent of the railway transportation capacity of the country was being utilized by building materials, and that, with not enough war labor, large numbers of men were employed in private building operations.

"It is not only the policy," the answer concluded, "but the clear and simple duty of the War Industries Board to see that the war programme of the country is met, and this programme must be met now, when the needs are upon us. This duty must be fulfilled, even if its fulfillment entails industrial loss in this country as it does human loss abroad."

With this answer the general storm passed, but there were numerous local cyclones to deal with. The churches and the schools and the like were used as the first line of attack. Chicago clamored for a huge temporary memorial building to the soldiers; "Billy" Sunday, the evangelist, wanted permits for great temporary tabernacles; New York City insisted on an \$8,000,000 school building project; and so on. Chicago finally withdrew its application, Sunday, after he was told of the need, telegraphed that he would "gladly comply," and Mayor Hylan, of New York, had to endure an unyielding "no" to his appeal to Mr. Baruch. In the last-named instance strong political pressure was brought to bear on the chairman, the line of this appeal being that he was a Democrat, and should help the party in New York City by making it possible

for Mayor Hylan to keep his preëlection pledge of more and better schools in that city.

Apropos, the writer — merely to confirm what he already knew — has made it a point to inquire of most of the principal executives of the War Industries Board as to what, if any, influence partisan politics had on the administration of the Board. The replies have invariably taken the form of a categorical and emphatic negative and have usually pointed to the fact that the personnel of the Board was overwhelmingly Republican. It has not been possible to find the faintest trace of a single appointment being based on anything else than presumed fitness for the task. As a matter of fact, most of the Board men were so little concerned with politics that they did not ask each other's partisan affiliations. Just after the war, however, at a dinner attended by these executives, a poll was taken, and it was found that of those present there was only one Democrat — Mr. Baruch. The political government of America remained of one party throughout the war, but the industrial government — for that is what the War Industries Board really was — was entirely non-political. No formal decree by Congress of an industrial coalition government could have realized anything like the non-politicalism of the industrial control of the Nation that characterized the War Industries Board.

It might be inferred, from what has been said about the storm aroused by the restriction of the building industry, that it was a peculiarly selfish business group. Such is far from being the case. The reaction to restriction was simply in proportion to the blow — the most sweeping that was dealt to any great industry during the war — a blow of thousands of reflexes which struck sturdy American individualism in every section of the country. The farmer who wished to build a new barn and the industrialist who was planning a new plant were alike hit and hit hard. Naturally they were angry at first. However, as Mr. Baruch showed in his letter to the Senate, the trade had been consulted in advance through many of its most representative men, and had acquiesced in the decree — so that it had the advantage of coöperative support.

The protests were largely from those who would build

rather than from the builders themselves. Despite the fact that for a time more than half the War Industries Board's mail related to the work of the Non-War Construction Section and that countless delegations and individuals made pilgrimages of protest to Washington, it is authoritatively stated that only one personal protestant refused to approve the course of the War Industries Board after the subject had been canvassed with him. A superb illustration of what a rationally plastic human material the leaders of America have to work with! If American democracy had borne no other fruit than this plasticity which arises from the deep-lying devotion to the common good of a people who share in the common control, it would have been vindicated by this fine fruit alone.

"I tell you," said Samuel M. Vaucrain, the great locomotive manufacturer, to the writer in talking of his experience in the War Industries Board, "you will go a hell of a long way before you will find men like our Americans and the way they worked together in Washington. There was no other government that had such a crowd. You can talk about Baker, about Daniels, about President Wilson; but the people who won this war and the people who managed this war and who were responsible for the results are the common people you see walking around here and everywhere."

Out of many thousands of instances of reasonableness in the face of great personal disappointment, take the case of an influential Democratic member of Congress from New York. He had purchased a new home, which he was enlarging to meet the requirements of a numerous family, and it had already been partly dismantled. Ordinarily in such a case a permit would have been granted, but in this instance the application was denied because the applicant was a Congressman!

It was explained to him that many houses, schools, and hospitals in his vicinity had been held up, and that it would make a bad impression if a Congressman were able to build when others could not. The legislator admitted the force of the argument without a moment's hesitation and withdrew his application.

The Non-War Construction Section, though firm in fidelity to its functions of restricting some forms of production, that

others more immediately necessary might be stimulated, was never arbitrary in manner or method. It kept the general result rather than the particular in mind and permitted the continuation of such building operations as were in line with the broad policy of not upsetting the industrial fabric just for the dramatics of the thing or for merely disciplinary reasons. It was one of the greatest factors in balancing war demand with war supply by means of curtailment on the one hand in order to effect expansion on the other.

The Advisory Committee on Plants and Munitions was a survival of the old Council of Defense Munitions Standards Board, which had a committee on production that persisted through the different phases of the War Industries Board, and in the reorganization in the spring of 1918 was named as above. The evolution of the Board restricted the committee's functions somewhat, but it remained throughout a powerful stimulator of production, especially in locomotives and ordnance. At its head was Samuel Vauclain, president of the Baldwin Locomotive Works of Philadelphia, the other members being Captain J. C. Rockwell, J. M. Hanson, Henry R. Rea, Frank W. Morse, Admiral A. R. Couden, and G. M. Shaw.

It will be something of a surprise to those who recall the wholesale denunciation of General Crozier and others for the decision to alter the British Enfield rifle to take American Springfield cartridges and standardize its parts, as an unpardonable delay when some of the new divisions were drilling with broomsticks, to learn that this decision had the wholehearted approval of such practical men as Mr. Vauclain and his associates. The decision, he testifies, resulted in a great increase of production.

Mr. Vauclain, although he had been manufacturing the British rifle for the British Government, declares that it would have been "a crime to have made it and given it to our boys to use." The remodeled Enfield, standardized and using the same ammunition as the Springfield, could be put together in one minute and forty seconds; and eight thousand were turned out in a single day. The plants making the British rifle changed their tools so rapidly, as the alterations in design were made, that quantity production began the day

after the last alteration. So great were the production advantages of standardization that the United States within ten months was turning out service rifles twice as fast as Great Britain. In a single week fifty-one thousand rifles were made of both the Springfield and Enfield types. In no other part of their equipment were the American soldiers so liberally and excellently supplied as in service rifles. What was denounced at the time as a colossal blunder of judgment on the part of Secretary Baker and the War Department was in fact one of the soundest things done in the whole war. Public criticism is the best safeguard of government, but it sometimes makes costly errors.

The Vaucrain committee also sustained the army in its adoption of French artillery designs, instead of taking over the production of plants which were making guns for the British. "If they had not adopted the French guns, they would have had nothing," says Mr. Vaucrain, who is of the firm opinion that both French guns and projectiles were better than the British. And yet it must be recorded that, owing to the tardiness of production of the French type of guns, the War Department was compelled to contract, in October, 1918, for a considerable quantity of English artillery to be made in England that it could have had in 1917 from American plants that had been producing the British guns and that could have swung immediately to the production of them for the American army. In the long view, the adoption of French types was sound, but, considering that British types were in production in America when we entered the war, they should have been used to the utmost at first.

This book is not a history of munitions manufacture, and much of the work of the Advisory Committee on Munitions and Plants was of a highly technical nature. It had certain routine duties to attend to, such as the compilation of munitions production reports and the like, but its most brilliant and appealing work was in its use of the personal equation. It rallied men and plants through the personal appeal for feverish jobs in the making of locomotives, rifles, artillery, forgings, shafting for destroyers, gun carriages, shells, and ammunition in general. American manufacturers were reluctant and slow to drop other business and take up the making

of munitions of which they knew nothing from experience, and there was a general aversion to "Government business" as being unprofitable and vexatious. Mr. Vauclain and his assistants were among the cheer leaders who rushed them to the job.

"Look here," said Vauclain to Baldwin, of the Otis Elevator Company, "the time has arrived for every red-blooded American manufacturer to take off his business coat and get to work manufacturing military goods. We can do without elevators. You cannot get any wire rope for them, anyway. Put your brains and the brains of your staff on this gun-carriage business!"

"Vauclain, the business coat is off," was Baldwin's prompt answer as he threw his coat on the back of a chair; "now, what do you want me to do?"

"Make 244 mm. recuperators."

Baldwin did not know a recuperator from a cartridge, but he made them.

The navy wanted railway mounts for the fourteen-inch guns that were intended to snuff out the "Big Bertha" that was shelling Paris at a ninety-mile range. It furnished the designs and called for bids. Nobody could make them under nine months.

Vauclain said he could have them built in four months; he had them on the way in three. One factor in this success was the perfection of the drawings furnished by the navy.

Vauclain's method was entirely the personal method, and he sometimes collided with policies of his own organization — the War Industries Board. An amusing incident arose therefrom in connection with the making of the naval fourteen-inch gun mounts. They were building before the priority order came through and Vauclain applied for priority for sixteen similar jobs for the army. He encountered the army and navy priority representatives in a heated wrangle. The army man was opposing, as he supposed, priority for the naval gun carriages.

"What in hell is the use of talking about what's done?" exclaimed Vauclain. "I want priority now for those army guns." This was quite a horse of another color to the army man and Vauclain got his priority.

Before the creation of the Railroad Administration, the Advisory Committee was specially charged with locomotive and car production, and had much to do with the facilitation of production through the standardization of different types of locomotives. In this, as in hundreds of other matters relating to the practical side of production, the Advisory Committee on Plants and Munitions was the constant counsellor and adviser of the War and Navy Departments. Under its direction and through its knowledge of men and plants there went on a vast conversion of industries from implements of peace to weapons of war.

Another special task was the procuring and forwarding of supplies for the Czecho-Slovak army which was just then completing its eclipse of the march of Xenophon's Ten Thousand by fighting its way across Russia and Siberia to Vladivostok. Just as the war ended, the chairman of the committee was starting for France at the request of General C. C. Williams, Chief of Ordnance, to take charge of the big tank assembling plant at Châteauroux.

The Fire Prevention Section, of which W. H. Merrill was chief, was established in April, 1918, in order to conserve products and production through precautions to guard against destructive fires, many of which had already occasioned serious losses. This section inspected and made fire-prevention recommendations for all plants having more than a hundred thousand dollars worth of Government orders. Mr. Merrill was assisted by Frank E. Pierce, W. E. Mallalieu, George W. Booth, and Charles H. Smith.

As the war went on, it became increasingly apparent that a very important volume of necessary materials and goods was being hoarded or stored by speculators, held on foreign account, concealed by pro-Germans, or in other ways kept from consumption. Accordingly a Stored Materials Section was formed in December, 1917, with John F. Wilkins as chief, with the function of locating, unearthing, and inventorying all such stores. In prosecuting its work this section was of great incidental help to the War Trade Board, by informing it of goods intended for foreign consignees on the enemy-trading list; to the Alien Property Custodian, by giving information about enemy-owned goods; and to the

transportation agencies by its information in regard to congestion of goods in warehouses, on docks, and in railway terminals. Later this section took up the operation of a plan devised by the Conservation Division for an interdepartmental clearing-house to bring into use the surpluses or inactive materials that the various departments had accumulated, through change of programme, overcalculation, etc. The navy, for instance, might be in need of materials or goods of which the army had a burdensome excess, and *vice versa*.

The chief sources of information of the section were the various governmental intelligence services, the insurance companies, the banks (through their collateral loans on stored materials), voluntary individual information, and systematic inventories of stores in certain warehouses. The insurance companies were loath to open up their private records at first, holding that they were sacredly confidential, but eventually means were found to persuade them to coöperate cordially, and voluminous information thus came to light. A single insurance company report, for instance, disclosed one hundred thousand pounds of copper just at a juncture when it was a Godsend for the navy. The section turned its data over to Alexander Legge as chief of the Requirements Division, who disposed of it according to war needs; and the various purchasing agencies of the Government were also notified, as well as the chiefs of commodity sections of the Board.

At a rough estimate the section uncovered a billion dollars worth of goods concealed purposely or by accident. Its revelations were in the nature of a surprise package. When every other source was exhausted, an agency with unsatisfied requirements would reach into the Wilkins grab-bag. On one occasion it yielded the army one hundred thousand kegs of wire nails when nails were scarcer than practical men in Soviet Russia. Speaking of Russia, the Stores Section located an immense amount of supplies destined for the Kerensky Government, but held up on its downfall. They consisted of woodworking machinery, agricultural, railroad and wagon-road equipment, projectiles, guns, and metal-working machinery. The work of the section put an end to a period of opéra-bouffe looting. It is stated that at one time two hun-

dred motor trucks from these Russian stores were being used by the grafters in private trucking businesses on Long Island. The sidings for twenty or a hundred miles back of Seattle and Vancouver (B.C.) were blocked with Russian goods, mixed up with goods intended for Japan. The latter were, of course, legitimate, but the work of the Stores Section contributed to getting them moved out and sent on their way.

The Emergency Construction Committee, under W. A. Starrett, of New York, is properly considered here because, while its work was pretty well headed into the War Department, it played a large part in equalizing supply and demand through its introduction of form and plan into the huge building programme of the army, which involved in its earlier stages some 336 projects costing \$619,000,000. The most impressive phase of the committee's work was during the rush to build the cantonments for the National Army in the spring and summer of 1917. It was responsible for the creation, organization, and, largely, the personnel of the Army Construction Division, and until the end of the war it maintained the most intimate relations of an advisory and informative nature to that division. It acted as a clearing-house for commodity sections that were concerned with building and building materials, and was very helpful to the United States Housing Corporation in its early stages. As the army had virtually no building organization at the beginning of the war, the practical men of the committee carried the load of the brilliant achievement of erecting, in about ninety days, the edifices of temporary cities of thirty thousand population each for fifty army divisions, as well as other army buildings. Without its practical knowledge and inspiration one of the most impressive construction feats in the history of the world would, under the circumstances, inevitably have been a long-drawn-out chaos. As this committee was the pioneer governmental agency in dealing with cost-plus contracts, it was a storm center of criticism arising from the inevitable abuses of that form of business relationship, but no one has yet brought forward any substitute for its method of meeting the building emergency that confronted it.

This emergency was marked by the following features: the projects arose quickly and unexpectedly; there was little

or no time between conception and inauguration of the work; preliminary estimates of cost were impossible; planning and building had to go on together as the work developed. Under these and many surrounding circumstances, together with the fact that immense lump sums had been appropriated which might be far in excess of costs, and were, therefore, tempting to reckless and profiteering contractors, it was felt that the Government must rely on the "strong and experienced building organizations of the country." That these organizations did not abuse the confidence that was reposed in them is shown by the fact that the average contractor's remuneration on the 1917 work was only 4 1/2 per cent, and on the total only 3 2/3 per cent. Undoubtedly the costs to which these percentages¹ were applicable were excessive as compared with corresponding costs in ordinary times, but they were less than they would have been if contracts had been let on bids to careful and responsible builders, who would have been compelled to allow ample protective margins against the runaway prices of the times. G. W. Lundoff, of Cleveland, was for a short time chairman of the committee, but throughout its period of attachment to the War Industries Board Mr. Starrett was its chairman. Frederick Law Olmsted, of Boston, was a member of the committee from its beginning. In the final period the other members were John Donlin, president of the Building Trades Section of the American Federation of Labor; Major Clair Foster, Engineers Corps; and Lieutenant J. B. Talmadge, secretary. At an earlier period Major M. C. Kelly represented the Engineers, and M. C. Tuttle, of Boston, was another member.

The Inland Traffic Section was virtually the channel of communication between the War Industries Board and the Government Railroad Administration, whereby the railways were made responsive to the policies of the War Industries Board. This was a tremendously important function, but is so bound up with the Railroad Administration proper that to attempt even to sketch the section's work would be to write a short history of the Railroad Administration. T. C. Powell, an experienced railway man, an important officer of

¹Thanks to the good judgment of Julius Rosenwald, the amount of profit on any single contract was limited to \$250,000, which was productive of efficiency and celerity and brought down the profit percentage.

the Railroad Administration and a member of the Priorities Committee, headed this section. As such he became the great war-time conservator and husbänder of railway transportation. The railways, like many other agencies, "won the war," but no small part of their share in the victory was due to the manner in which the most was made of the total sum of transportation, which was primarily a War Industries Board job. So close and loyal was the union between the War Industries Board and the railways that for war purposes the latter were as much at the disposal of the Board as any of its own divisions or sections.

As an outcome of the development of the plan for balancing requirements and resources, the Facilities Division was established as the war was nearing its end. It was to handle the problem of providing facilities of manufacture to meet future requirements after they had been approved by the Requirements Division and the appropriate commodity sections; and, in regard to immediate orders, was to clear them with advice or instruction as to what facilities were to be used. In a word, it was to be the supreme conservator of manufacturing instrumentalities to the end that they might to the greatest possible degree carry the burdens that were assigned to them. In a way the Facilities Division was but a further step beyond the field of the Resources and Conversion Section, but it was intended to be more of a future-regarding and planning body, with an almost unlimited scope. Its creation affords an admirable illustration of the grasp, foresight, and vision with which the War Industries Board was dealing with its colossal problems in the latter part of 1918.¹

Samuel P. Bush, of Columbus, Ohio, was made chief of

¹The duties of the Facilities Division were laid down by the War Industries Board as follows: (1) "The division will make a comprehensive study of all aspects of new construction projects, advising in respect to proposed locations on the availability of power, fuel, labor, building materials, raw materials, etc.; (2) it will advise in the selection and specification of materials of construction, so as to avoid long hauls, especially through the congested district, and so as to avoid conflicts with orders already placed; (3) it will look to the adoption of forms of contract such as will insure uniformity and consistency in all Government building activities; (4) it will compile and from time to time revise lists of responsible contractors and architects throughout the United States equipped to undertake construction work of various kinds, furnish such lists to Government agencies upon request, and it will keep a record of existing Government contracts with a view to preventing interference between new and

this division. He was a successful manufacturer and had been chief of the Board's Section of Forgings, Ordnance, Small Arms, and Ammunition. His assistants were Captain C. Bamberger, C. W. Carroll, M. F. Chase, F. L. Dame, Captain W. B. Dickinson, J. I. Downey, L. H. Kittredge, G. E. Miller, L. B. Reed, and H. Williams. The big task ahead of this division was that of reducing the congestion in the northeastern section of the country through the development of facilities elsewhere, and the prevention of any like jams in the future. The so-called breakdown of the railways under private management was chiefly the result of the overloading of this industrial section with Government business. It got to be almost impossible to get goods into or out of this region because the railways were called upon to do two years' work in one. The Government Railroad Administration found the problem as hopeless as the private managers, and Mr. McAdoo called upon the President to take steps to extricate the railways from a condition in which they were slowly strangling. The President turned to the War Industries Board, which was, however, already working on the problem through a number of channels, with the purpose of diverting a part of the Government demand to other sections of the country.

No lesson of the industrial side of the war will be longer remembered than that taught by the penalties of the overworking of the northeastern section of the country. Even without a Grand General Staff or some equivalent organization, no efficient industrial mobilizer of this generation will permit the repetition of the error of 1917, whereby the manufacturing potentiality of the country and the efficiency of a large part of its railroad system and marine transport were almost negated by a congestion of production and transportation. The harm was done before the War Industries Board had grown up to its full stature and responsibilities. It was easily and naturally done because the northeastern

old orders; (5) it will prevent the creation of new facilities in localities where the condition of existing facilities is such that new ones would be inadvisable; (6) it will endeavor to coordinate the activities of all departments and agencies of the Government in construction work of every kind except shipbuilding; and (7) it will study prospective departmental needs and make plans for the new facilities necessary to meet them." (Final Report of War Industries Board.)

region is the center of the metal-making and using industries, and also the region of the greatest general manufacturing development. To go elsewhere meant investigation, planning, and conversion. So the Government purchasing agencies followed the path of least resistance, and kept on following it until long after it was the one of the most resistance. The result was that the most extensive industrial region in America came near to nullification as a contributor to the early success of the war by being smothered under the immovable mass of its own product.

One of the most interesting growths in a war organization that was a congeries of growths — which like all living things are full of interest — was the Division of Planning and Statistics. This was really the War Industries facet of a threefold statistical organization, which grew up from necessity rather than from a triune plan. The army was demanding more and more ships from the Shipping Board. To grant these demands the Board had to withdraw ships from commercial uses that were fundamentally military, and also to disturb the balance of trade upon which depended the possibility of securing the foreign materials that were necessary to the industrial life of the country. A nice priority problem was involved. It could not be solved unless the War Industries Board, the Shipping Board, and the War Trade Board were all tied in.

Judge Parker first sought to meet the problem by establishing Dean Edwin F. Gay, of Harvard, then a member of the Commercial Economy Board of the Council of National Defense, later the Conservation Division of the War Industries Board, as an expert adviser to him in priority matters relating to shipping. This did not appeal to Dean Gay as meeting the triangular situation, but when Chairman Edward N. Hurley, of the Shipping Board, asked him to establish for that body a Division of Planning and Statistics whose first important job would be to study imports with a view to applying the principle of priority to their reduction in order to release shipping for the army, he accepted; the more readily as he was simultaneously made a member of the War Trade Board.

In the latter capacity Dean Gay was able personally and

authoritatively to urge the reduction of imports through that body's control in accordance with the result of his investigation. This investigation was designed to establish a list of materials which could be entirely excluded from importation, another of those that would be excluded in part, and a third of those that would have to be imported in full or larger than current amounts. Thus a Shipping Board Division had completely invaded the peculiar field of the War Industries Board in the task of balancing supply and demand, or resources and requirements. At the same time the War Industries Board had its member of the War Trade Board and was continually resorting to foreign trade control in its manipulation of industrial strategy.

About this time the War Industries Board lost to the army the Statistical Division of the Council of National Defense, which was taken over almost in a body by the General Staff. This division, initiated by the writer's predecessor, and headed by Dr. (Colonel) Leonard P. Ayres, a purely civilian enterprise, had turned out to be of inestimable value to the army, which, surprisingly enough, came into the war without any adequate statistical organization of its own. Thus deprived of a general informational instrumentality, the War Industries Board naturally turned to Dean Gay, who by this time had established a Bureau of Research and Tabulation of Statistics in the War Trade Board. With the setting-up of the Division of Planning and Statistics of the War Industries Board there was established a machine of coördination between shipping, foreign, and domestic trade.

But the purpose of the new division was even more ambitious. It was intended to be the seer and prophet of the War Industries Board, the general agency of deliberative and reflective contact with the Board's impending problems and the supplier of data for the solving of its current problems. Virtually all of the commodity sections and divisions of the Board were conducting their own statistical researches, but, entirely apart from the needs of central survey and general thought, there was need of a composition of the data obtained by them.

Dean Gay was chairman and Henry S. Dennison assistant

chairman of the new division. Dr. Henry R. Hatfield was in immediate charge, and six sections were established. The Section on Price-Fixing, under Professor W. C. Mitchell, worked in close coöperation with the Price-Fixing Committee. It made a thorough study of war-time price movements, the results of which were published in a series of fifty-seven War Industries Board bulletins. The War Contracts Section, under Mills E. Case, sought to obtain a complete record of war contracts and deliveries, but was never fully successful in this because of the impossibility of getting the purchasing agencies to make full reports. Efforts to obtain information directly from manufacturers did not fare much better, and this phase of the requirements programme shared in the general defectiveness of the determination of requirements, which went primarily to the War Department's failure in this respect — a failure that was partly destined in the circumstances and partly the result of the failure of the human factor.

The Editorial Section informed war agencies of the status of the supply programme; the Section on War Industries Abroad gleaned helpful information from the industrial experience of allies and enemies, and the Commodity Statistics Section drew to central points the statistical data of the commodity sections, helped them to organize their own statistical agencies and collect information, and assisted in the formation of joint statistical instrumentalities between the sections and other war agencies.

The Questionnaire Section centralized the function of obtaining information by circulars. So many Government agencies had recourse to the mimeograph, the printing-press, and the mail in the quest of information that the burden of responding adequately became an intolerable absorber of time, labor, and expense to Government contractors. In many instances it was necessary to maintain large staffs for the purpose of answering the cloud of questionnaires. It was ordered that all War Industries Board queries should be issued through the Questionnaire Section, and eventually it became the questionnaire medium for pretty much all departments.

When President Wilson began to meet the heads of certain

war agencies weekly in the so-called War Cabinet, he felt the need of a clear and concise presentation of the progress of the war enterprise. The establishment of such a periodical survey had been recommended to him by the writer when secretary of the Council of National Defense, as well as by Representative Swager Sherley, chairman of the House Appropriations Committee. The President asked the writer to elaborate his views and then immediately called on Mr. Baruch for this "conspectus," but, owing to a desire to avoid any suggestion of the superimposition of the Board over other agencies, they made their returns of the required data to the President, who then sent them to the War Industries Board for digestion by the Division of Planning and Statistics. Because of the secret and confidential nature of the data, a carefully chosen staff, with separate quarters, was assigned to them.

The first thing to do was to compile a review of the various war agencies and their functions; the next to arrange for a flow of statistical data from each of them for summaries that were at first monthly and then weekly. The review had the advantage of showing overlappings and duplications of functions. For the purpose of getting the precise information required, "contact" men were established in the different war agencies. The first report this section secured from the Navy Department is believed to be the first consolidated report that even the Secretary of the Navy had ever had. So airtight were some of the bureaus in the war agencies that the compilers of the conspectus found themselves in possession of information that was not available to other bureaus within an agency! The conspectus was compiled weekly for some time after the armistice and was sent regularly to the President while he was in Paris, thus providing him while away from the Capital with an excellent governmental panorama.

In general, the section had the most cordial coöperation of all departments, though there was some opposition to the compression of data that the section was bound to make in preparing a bird's-eye view of the general situation, as the departments naturally wanted the President to see a full and detailed statement of their achievements. In the case of the

War Department there was also the difficulty that both the General Staff and the supply agencies had separate statistical organizations. For some reason the Labor Department was a hard one from which to extract data at first. The State Department was so independent that no effort was made to include its activities in the conspectus, and it is doubtful if the President ever had more than a loose and general verbal account of the information gathered from its various foreign representatives. The Department of Justice was also a hard nut to crack, and the writer has it on excellent authority that the President probably never knew very much about that department's activities.

The compilation of the conspectus involved searching and critical inquiries, and brought out among other facts the important one that the army was prone to overestimate requirements when it did estimate, without regard to the facilities for manufacture and conveyance and the rate of consumption of the goods. Important revisions of estimates followed. This work showed, too, that the War Industries Board should not have drawn the line between civilian and military duties so sharply that it would rarely question the validity of a military statement of requirements. The revelations of the conspectus research would doubtless have brought about a certain intervention of the Board in requirements at their source, but it was ticklish ground.

The three-in-one statistical organization of the Shipping Board, the War Trade Board, and the War Industries Board was powerful in working harmonious coöperation in the balancing of marine transport, facility, and requirement. It was largely instrumental in releasing shipping for military service by reducing imports. In fact it was on the prospect of its success that President Wilson pledged General Pershing a large accession to the troop and military cargo fleet, when such an assurance was indispensable to the General's plans.¹

¹As a matter of fact, the Ship Control Committee, set up by the Shipping Board, appears to have allocated ships in defiance of the War Industries Board. It was the Allied Maritime Council that really saw to it that ships were provided for Pershing. The United States was represented on the Council by Commissioner Stevens, of the Shipping Board, assisted by Dwight Morrow, of J. P. Morgan & Co., and George Rublee. The British members, at the height of the shipping crisis in May, 1918, convinced the Americans that the United

The Statistical Division was frequently called upon for special investigations and reports, such, for example, as one on watches for the A.E.F. and another on the "thrift" campaign for the Treasury Department. Immediately after the war it put out an invaluable volume on the history of prices during the war. The statistical bodies of the Shipping Board, the War Industries Board, the Food Administration, the Fuel Administration, and the War Trade Board joined in making a survey of the economic situation of the world, with particular reference to the United States, for the uses of the Peace Conference. Dr. Hatfield was chairman of the Fusion Committee; Dr. Ernest L. Bogart represented the War Trade Board; Dr. Frank M. Surface, the Food Administration; Mr. Finch, the Shipping Board; and Dr. Leo Wolman, the War Industries Board. The division also made a study of post-war labor conditions, in connection with the Department of Labor, and issued weekly reports on labor conditions which were of value in industrial readjustment following demobilization and the suspension of war industries. This work was transferred, after the dissolution of the War Industries Board, to the War Trade Board and was continued well into 1919.

It is noteworthy that the Statistical Division was only coming into its own when the war ended. Logically it should have been the first agency of the War Industries Board to be developed to its full capacity; really it was the last. First to last, in all Government departments, the lack of ordered facts was a cause of inaction or of mistaken action. They were in a sense blinded because they had not developed eyes. Their work gave them eyes, whereas their eyes should have selected their work. Nobody is to be blamed for this except the Nation itself, which elected to be unprepared in the face of war just as it is now so electing even after the searing lessons of war. When the house is burning up, the first thing to do is throw on some extinguisher — not to

States was not doing its full share in the shipping pool because it had left too many ships in private trade. Mr. Stevens was so impressed that he sent Rublee and Morrow back to Washington to explain the situation to President Wilson. The former talked with the President personally, and both of them conferred with Baruch repeatedly. The fact that the American members were so ill-informed in regard to materials requiring shipping was one of the reasons for the creation of the Foreign Economic Mission of the Board, which by producing the facts was able to give great assistance to the Council.

compile a statistical study of the fire department's resources for fighting fire.

The War Trade Board, as a rule, worked so harmoniously with the War Industries Board that it could hardly have done the latter Board's programme better service if it had been an integral part of it. The two agencies were so closely related that it would have been better, theoretically, if the War Trade Board had been made subject to the War Industries Board. It was correctly in line with the duties of the latter board, as the balancer of requirements and resources to have complete control of imports. As we have seen, however, through the three-cornered statistical and planning organization there was a large degree of coördination between shipping, foreign trade, and internal trade. But beyond this the War Trade Board, in a spirit of complete coöperation, surrendered to the War Industries Board absolute control over foreign goods once they were imported. So, while the latter board was not in a position to dictate the nature and volume of imports, it was master of them once they were admitted — at least, after the reorganization following Mr. Baruch's appointment as chairman.

To make this union of the two bodies a vital one, Mr. C. M. Woolley was designated as the War Trade Board member specially charged with War Industries Board relations. He was also the War Trade Board's representative on the Priority Board of the War Industries Board and was in almost daily personal touch with Mr. Baruch. The latter and Vance McCormick, chairman of the War Trade Board, were also in continuous touch with each other. Dr. Alonzo Taylor, a member of the Food Administration and its representative on the War Trade Board — one of the clearest minds in Washington — was a potent agent for coöperation between the War Industries Board and the War Trade Board, and also the Food Administration. Mr. McCormick has perhaps never been given full credit for effective and self-sacrificing work. Like Baruch, he was indifferent to self-glorification and toiled whole-heartedly for the common goal, never thinking of or seeking personal or departmental distinction. The War Industries Board, through its Foreign Mission and its requirements of foreign products, and its

need of regulating the outflow of American goods, was continually invading the field of the sister board, but always with its cordial approval and assistance. On the other hand, the War Trade Board in negotiating treaties with the neutral countries, for the double purpose of economically isolating Germany and securing needed supplies for the Allies, often had to pledge in return certain American materials, which brought it into the sphere of the War Industries Board. It was for the latter to determine what could be spared. Thus it had its hand on both imports and exports in the interminable effort to balance goods and needs.

As the War Industries Board was always skating on very thin ice in the matter of legal authority for its policies and acts, it had great need of a mobile, resourceful, and tactful legal department. One of the thinnest and most treacherous spots was the reconciliation of the virtual pooling of production and orders absolutely essential to the coördination of industrial potentialities with the inhibition of combinations by the anti-trust laws. Another rubber-ice spot was the question of responsibility for damages resulting from the application of priority regulations. This was not so much from the producers, who had to shape their deliveries according to priority instructions, as it was from those whose orders with producers were delayed or cancelled because of Government necessity. On these and many other matters the whole War Industries Board was often in need of the sagest counsel. The Legal Department was placed in the Priorities Division. Thomas N. Perkins, of Boston, was chief counsel, and Robert J. Bulkley, of Cleveland, was chairman of the legal committee.¹ The general counsel of the Board itself was Albert C. Ritchie, now Governor of Maryland. International questions were handled by Chandler P. Anderson, former counselor of the Department of State. All served without compensation and even paid their own expenses. The small amount of litigation that has

¹The other members of the committee were Henry M. Channing, Boston; Wilford C. Saeger, Cleveland; Walter H. Pollak, New York; Charles W. McKelvey, New York; E. M. Dodd, Jr., Cambridge, Mass.; Herbert A. Friedlich, Washington, D. C.; Louis S. Weiss, New York; D. H. Van Doren, East Orange, N. J.; A. Ettinger, Cleveland.

resulted from the War Industries Board's operations is the measure of the success of the Legal Department.

Another functional body, associated with the Priorities Division, was the Labor Priorities Section, which will be considered, however, in the chapter on the Labor Division of the Board, which in a large sense was the balancer of labor supply and demand. The Employment Management Courses Section, though organically in Mr. Legge's administrative division of the Board, naturally falls into that chapter also. There are still other sections that might be classed as exercising special functions in the balancing of resources and requirements, but as virtually all the sections, though classified by the commodities they dealt with, were at all times primarily functioning in that capacity, it would be profitless to follow further the segregational basis of this chapter. The story of their work will be told under subjective chapter groupings.

In truth, the whole War Industries Board was but a vast industrial stabilizing and equalizing mechanism. It all seems complex, intricate, and illogical in many respects. It was not a standardized product; it was built on the ground and patched and added to to do the work that must be done. It was made by its environment and was adapted to it.

CHAPTER XI

CONSERVATION: REDUCING AMERICA'S SURPLUS TISSUE

Thrift at the source—Shaw projects his plan—First, economy; second, economy; third, economy—Bread for two hundred thousand persons saved—The chemistry of voluntary coöperation—The technique of procedure—Cur-tailing the capricious customer—Paper wrappers for wooden cases—Excising the dead matter of industry—Nine lines of approach—Ambassador Jusserand and the modistes—Shaw attacks corset steel, tin, spool thread, typewriter ribbons, farm wagons, buggy axles, trace chains, motor-cycles, alarm clocks, tinfoil—Salvaging wool for nine hundred thousand uniforms—Peace-time benefits—Shaw meets Baruch—Conservation without destruction succeeds—Lessons for to-day and to-morrow.

LET us liken the American industrial Colossus, adapting and fitting itself to war, to a strong but over-fat athlete getting into condition. It may be said with a sufficient degree of accuracy that, while other parts of the War Industries Board supplied the conditioning exercise, the Conservation Division directed the internal removal of superfluous tissue. While the other divisions and sections toughened and strengthened the muscles, the Conservation Division reduced the fat.

The simile is applicable in another view, too. The War Industries Board strove to get its fighting Nation into trim without permanent injury to the muscles that were not needed for the task. This policy was peculiarly the function of the Conservation Division. Instead of leaving the unneeded muscles to atrophy, it gave them enough attention to keep them alive whilst eliminating all useless tissue. Instead of abandoning industries that could be dispensed with in war, the general policy was to eliminate from all industries—even the most essential—all the non-essential parts, processes, functions, and products. The outcome was a fighting Nation, hard as nails.

The more essential industries were necessarily developed beyond the requirements of peace-time symmetry, but the less essential were still vital and ready to "come back" rapidly and easily—and they did. War-time conservation, as practiced in America, was a policy of saving and husbanding rather than of ruthless elimination.

The Conservation Division was the one agency through which the quietly performing War Industries Board, working for the most part with the controlling men of the great industries through unheralded and often unknown conferences and agreements, and through regulations that directly affected economic integrations rather than the individual citizen, was in contact with the citizen. Ask the average merchant or manufacturer what the War Industries Board did, and nine times out of ten he will refer to functions of the Conservation Division. Ask the men or women in the street, and they will tell you that it lowered women's boots and curtailed women's skirts or gave the man his smoking tobacco in paper instead of tin and made him take the place of a delivery wagon with respect to the household commissariat. In the public mind the Conservation Division ranked with the Food and Fuel Administrations as an intrusive and, therefore, highly interesting factor in daily life. The Food Administration shaped the citizen's bill of fare; the Fuel Administration figured in his fuel quantities, qualities, and costs, and in his lighting of office and home; the Conservation Division shortened his coat, altered its material, defined its color and pattern, and touched the customs and habits of his life at many other points.

The function of the Conservation Division was the exercise of thrift at the source, as distinguished from money savings, which might or might not result in the actual saving of labor, service, and materials. It was a tangible saving and its fruits were immediately and automatically available for war purposes. A man released by this sort of economy was one man more for the army or another worker for the war industries; a pound of steel saved by it was another pound for ships or guns or some other of the many war requirements for a commodity in which there was a deficit.

To save and salvage is so obvious a complement of intensified production to meet a surpassing demand, and so much easier of immediate approach, that it is not surprising to find that the Council of National Defense had an efficient organization for this purpose while much of its other work was still in process of incubation. Also, it was a function that could be undertaken to a large extent without the



CONSERVATION DIVISION OF THE WAR INDUSTRIES BOARD

Left to right, front row: Dr. Melvin T. Copeland, Director of Bureau of Business Research, Harvard University; Herbert E. Peabody, Sales Agent, Shellbourne Mills, New York; George N. Peek, Vice-President Deere & Co., Moline, Ill.; John W. Scott, Carson, Pirie & Scott, Chicago; Bernard M. Baruch, New York; A. W. Shaw, A. W. Shaw Co., Chicago; J. E. Ware, Maesell-Ware Co., New York; William T. Beatty, Austin Manufacturing Co., Chicago.
Second Row: M. C. Dizer, Dennison Manufacturing Co., Framingham, Mass.; H. C. Ross, Chicago; G. V. Dickinson, Elgin National Watch Co., Elgin, Ill.; M. B. Freeman, Dennison Manufacturing Co., Framingham, Mass.
Third Row: Richard Lennihan, Westwood, Mass.; H. F. Bruning, Oakland, Cal.; J. Linden Leacock, Leacock & Hokanson, Philadelphia; Carl H. White, Joseph Richards Co., New York; Mancel T. Clark, Wadsworth-Howland Co., Chicago; John M. Curran, Chicago.

coöperation of the war-making agencies, and, consequently, was a simpler and more direct task. There was no need to wait on war programmes and requirements, as in the case of production. The subject-matter was ready in the perfectly patent excess baggage of services and goods with which a settled life encumbers itself. Yet the initiative in this important enterprise was supplied by a man who was not at the time connected with the Council or its Advisory Commission.

A Chicago business man, A. W. Shaw, a publisher of business books and magazines, notably "System," was, appropriately enough, the initiator. His business interests in England had resulted in bringing very forcibly to his attention how little system there was in both England and France in the studied adaptation of industry, commerce, and civil life in general to the requirements of war. He found that the principle of orderly priority was virtually unknown in those countries outside of the rationing of the people. Civil and military needs were largely left to free competition with each other for capital, labor, facilities, and materials; while in Germany they were following a very definite plan of "stretching industry."

Like many other patriotic citizens, Mr. Shaw went to Washington, in the days of suspenseful, belated preparation just preceding the declaration of war, to ascertain through the Council of National Defense what was being done or needed to be done to meet the approaching test. He had clear and well-defined ideas of commercial economy applied as a means of meeting the unprecedented demands which he knew, from personal observation in England and study of the economic reactions of war in Germany and France, would tax the energy and resources of the Nation to the utmost.

Finally, in a luncheon interview with Secretary of Agriculture Houston on March 23, 1917, he presented his plan so persuasively and convincingly that Mr. Houston was an immediate convert. Secretary of the Interior Lane — also a member of the Council — was immediately called into the conference by Mr. Houston, and he asked Mr. Shaw to put his proposals into writing at once, so that they might

be submitted to the Council at a meeting to be held the next morning. This was done, the Council approved, and the Commercial Economy Board was immediately instituted with Mr. Shaw as chairman.

It is worth mentioning that the Commercial Economy Board was a creature of the Council proper, not of the Advisory Commission which mothered most of the other activities that were grouped around the Council. Thus, until the Commercial Economy Board became a part of the War Industries Board a year later, as the Conservation Division of the latter, it occupied a position independent of the Advisory Commission and all its activities. This was a fortunate detachment. The Council was reluctant formally to endorse much of what the Board was doing, though the feeling of the individual members was that it ought to be done, so the Council for the most part looked the other way and let Mr. Shaw and his colleagues proceed according to their own judgment. In this way they were probably freer than they would have been if attached to the Advisory Commission, which, being responsible to the Council, might not have felt itself at liberty to give the Commercial Economy Board a wide range of independence without positive approval by the Council. On the other hand was a distinct advantage to the conservation function to be merged later with the War Industries Board when the latter had become an organism of power.

Mr. Shaw named as his associates W. D. Simmons, president of the Simmons Hardware Company, of St. Louis; E. F. Gay, dean of the Graduate School of Business Administration of Harvard University; George Rublee, a lawyer and member of the Eight-Hour Commission; and Henry S. Dennison, president of the Dennison Manufacturing Company, of Framingham, Massachusetts. Dr. Hollis Godfrey, of the Advisory Commission, was a member, *ex-officio*, of the Board; Alfred Pittman was assistant to the chairman, and Melvin T. Copeland was secretary. Mr. Shaw was determined in his choice of associates by the considerations of having business theory and practical merchandising and manufacturing experience and legal knowledge at his command. His judgment was confirmed both by the work

of the Board and by the fact that all four of the men he chose were ultimately called upon to render other services to the Government. Dean Gay became a member of the War Trade Board and chairman of the Division of Planning and Statistics of the War Industries Board, as well as of the statistical departments of the War Trade Board and of the Shipping Board; Mr. Simmons became a member of the Treasury Advisory Board; Mr. Rublee became the alternate American member of the Economic Council of the Allies and the United States; and Mr. Dennison became assistant chairman of the Division of Planning and Statistics, and also of the Shipping Board's statistical and planning work.

The Commercial Economy Board early established its purposes as follows: (1) to determine how economies can be effected in the distribution of commodities; (2) to determine what commercial services can be curtailed or dispensed with during the war; (3) to determine what economies can be made in the management of commercial businesses; (4) to study efficiency of administration with a view to conveying the results to less efficient business organizations; (5) to study operating expenses for the purposes of arriving at standards for general guidance; (6) to determine means of effecting economies in the commercial use of materials, such as wool and leather, that would be needed by the Government in large quantities.

The Council had not yet called on Herbert Hoover to take up the advisory work which was to lead to his becoming Food Administrator, so, as economy in the use of the primary foodstuff of the white races, wheat, seemed to be of prime importance, Mr. Shaw first set about a study of the uses and distribution of wheat. Bread seemed the nearest and most approachable angle of this subject. The handling of this first attempt to shape private economy for the public good became the model for the whole vast work that followed. The bakers were asked for suggestions, and their responses emphasized the matters of waste in delivery and in the returning of unsold bread by the retailers. It appeared that about five per cent of all bread made by bakeries was returned because it became stale before it could be disposed of. Having the privilege of returning

the loaves they could not dispose of, retailers were naturally in the habit of insuring sufficient supplies by ordering a little more than they probably would sell. Some of the returned bread eventually entered into human consumption, but most of it was food waste. Yet the total of the returns was enough to supply bread to two hundred thousand people, and there was an attendant waste of men and equipment involved in the handling of the surplus. The situation having been definitely determined by conferences and correspondence, and all but three of the wholesale bakers consulted having agreed that the elimination of the bread-return privilege was wise and feasible, a circular was issued to the trade on June 6, 1917, setting forth the consensus of opinion as to the desirability and practicability of the proposed economy and stating that it was the desire of the Government that it be effected. The response was unanimous.

As time went on, the Commercial Economy Board gained moral authority from custom and habit, and when it became the Conservation Division of the War Industries Board it had all of the powers that the Board had; but from first to last it conducted all of its operations on the principle of the bread regulation — of voluntary coöperation. It neither sought nor used power, for the controlling reason that it was profoundly convinced that imposed control could never be as effective as voluntary coöperation for a rational, common objective. This was not a mere theory born of optimistic confidence in men, but a definite conclusion to which Mr. Shaw had come from close observation of the way legal control worked in France, England, and Germany. As with the prohibition law in this country, it was there accepted as a challenge to a battle of furtive evasion and ingenious violation. It required elaborate and exasperating policing that resulted in large expense and a great waste of energy. And its effect on the popular morale was most demoralizing, for it concentrated public attention on the personal hardships of war and diverted it from the national purpose. In fact, it tended to divide the nation into hostile camps of occupational law enforcers, on the one hand, and the great mass of the people endeavoring to nullify it, on the other hand.

The establishment of the Food Administration made it outside the scope of the Commercial Economy Board to proceed further with food economies, but the principle of coöperation rather than of command was adopted by that administration as the very foundation of its work. Before Mr. Hoover was designated as Food Administrator, under the Lever Act, he was asked his opinion of the intention to do away with the bread-return privilege wholly by voluntary coöperation. Fresh from his experience of the arbitrary methods prevailing in Europe, he was greatly impressed, and answered: "If this can be accomplished on a voluntary basis, it would be infinitely better than if we should set up an elaborate engine for enforcement." It was most successfully accomplished — and it may be that the first achievement of the Commercial Economy Board gave the Food Administration its policy bent.

Following up its initial success, the Commercial Economy Board gave most of its attention in the early weeks of the war to savings that might be made in distribution of commodities, leaving economies of production till a later time. The technique of procedure was always the same — the ascertainment of facts by inquiry and investigation, the elicitation of suggestions for economy from the trade interests involved, the formulation of coöperative regulations in conference, and finally the issuance of the "recommendation."

Usually a few objectors and obstructors were encountered in each trade, but they always fell into line under the compulsion of trade opinion which automatically policed the observance of the recommendations. Whatever he may be at heart, no man covets the reputation of being a slacker or a sulker. He may flout and violate a law that he dislikes, but a practice adopted by the overwhelming consent and even insistence of his fellows, especially when it bears the label of patriotic service in a time of emergency, is not lightly to be disregarded. Men will seek to beat an arbitrary order, but they will loyally support an elected coöperative programme.

Whether the voluntary method was the outcome of the reluctance of Congress to pass laws interfering with

ordinary commercial customs, thus leaving the administrators of the commercial and industrial regulatory agencies without well-defined authority; or whether it was even more the outcome of a lesson from Europe's experience and knowledge of the American character is immaterial. The important fact is that from the start in the Council of National Defense the whole direction of industrial adaptation to the requirements and incidence of war was basically of the people rather than of the Government. Nowhere did this method meet with greater success than in the Conservation Division, which, excepting the Food Administration, came intimately in contact with more individuals in their daily life than any other regulatory agency.

After the elimination of the bread-return privilege, the Commercial Economy Board recommended the general adoption of the rule of no exchanges by retail stores of all sorts. It was found that as much as twenty-five per cent of the daily sales were brought back to the stores by capricious customers. Most of these exchange items were of small value, but they involved a tremendous waste of men and equipment. Then the Board inaugurated the plan of encouragement of the "buy-and-carry" habit, which was a complement of the recommendation for coöperative deliveries of merchandise and the adoption of only one delivery a day. The reductions in the number of men, animals, and motors thereby effected were startling. In more than three hundred of the larger cities merchants cut out special deliveries and reduced general deliveries to one a day; and coöperative delivery systems, which were still more economical, were established in about two hundred cities. In one city the number of delivery employees was reduced from 848 to 545, seventeen horse-drawn vehicles were discarded, and the number of automobiles used was lowered from 325 to 195. On the whole, the department stores found that simplification of deliveries reduced by twenty-five per cent the man power needed; the grocery stores had a corresponding reduction of fifty per cent, and the coöperative delivery systems sometimes operated with twenty-five per cent of the employees formerly needed.

Another line of distributive economies was found in pack-

ing and transportation, which dovetailed into each other. By simplifying and altering the form and materials of packages intended for transportation by rail or boat, a very substantial saving was effected in car space. The substitution of paper wrappers for pasteboard cartons and wooden packing-cases in the hosiery and underwear trade alone was estimated to be the equivalent of 17,312 freight cars' space and to replace 141,800,000 cartons and more than 500,000 wooden cases. These changes, of course, not only saved transportation, but diverted to other and indispensable uses the pasteboard and box lumber that the knit goods manufacturers could easily get along without. Like distributive economies were sought by increasing the number of units of goods placed in each container for shipment.

Still another transportation and materials economy was effected by reducing the number of sample trunks carried by the traveling salesmen of dry-goods wholesalers. Some salesmen were accustomed to take with them nine or ten heavy trunks. The average number was reduced to two. In this way many baggage cars were released for troop trains and the railways were relieved of a heavy burden.

Conservation by measures relating to delivery and methods of packing, however, was but a scratch on the surface compared with the deep cuts into the mountain of waste of energy and material effected by the reorganization of industrial processes and practices. It was found that almost all industries were encumbered with an unbelievable amount of unexamined tradition, that resulted in duplication of effort, waste of material, and unnecessary expenditures of energy. Industry as it was, compared to industry as it should be for war purposes, was as a barracks to a modern hotel. Everywhere was found the superfluity of luxury and taste and the impedimenta of custom.

Much of the rubbish that loads and clogs the economic machine was found in totally parasitic jobs, and almost every sort of production and service was found to be barnacled with uselessness. So deep is this economic mould and parasitism that the men of the Conservation Division ultimately became convinced that modern civilization is become anæmic from obesity. It is so encumbered

with what it is uselessly doing that vitality is denied to useful and essential organs. The simple life, thoroughly inculcated, it would seem from the work of the Conservation Division, would without increased productive effort take the sting out of the inequalities of life. Simplification of living, of production, and of distribution would insure an abundance of necessities and comforts for all. Of course, the simple life is not to be thoroughly inculcated, any more than the race is suddenly to be raised to that degree of individual excellence which conditions the perfect socialistic state. Superfluity of services and an abundance of useless trinkets, gewgaws, and baubles are a part of the price that civilization pays for the money instrumentality. Barter is too laborious and tedious to be the means of accumulating rubbish.

The Conservation Division found endless satisfaction and an almost inexhaustible source of supplies and power in these huge folds of fat of a luxurious civilization. Slothfully accumulated in the soft times of peace and surfeit, they were now converted from useless luxury to useful necessary. The fat was turned into muscle, and thus answered in a surprisingly large degree the question of how it would be possible for a busy nation to produce more in war than in peace, with thirteen million out of fifty-five million workers in the ranks or engaged in war service or production.

The elimination of the emergently useless was accompanied by a surprising release of energy, which fact throws a great light on the inefficiency of peace-time production. As Professor David Friday hints, it almost makes war appear a blessing instead of a curse. It took war to give comfort and sufficiency to millions who had not known them. Most of the soldiers were better clothed, better fed, and better housed than when at home, and their health was much better. Millions of toiling workers, more energetic and efficient than ever before, were healthier, wealthier, and happier than at any other time. It would appear to an amateur economist that, if some way could be found to keep the working people of the world busy with the vim of war-time, there would be such content and prosperity that

the cancerous growths of social destruction would have nothing upon which to feed.

The delicate task of removing the fat from the economic body without weakening the muscles or impairing its general health could not be accomplished in desultory fashion. It was necessary to have a programme applicable to all industries. Aside from the economies relating to distribution which have been glimpsed, there were nine lines of approach to the solution of the problem. These were defined by Mr. Shaw as follows:

1. To secure a maximum reduction in the number of styles and varieties, sizes, colors, or finishes of the product of industry. In this way economy in manufacturing was secured. The number of operations was reduced and by making larger runs less labor was required. Manufacturers were enabled to simplify and reduce their stocks of raw material, and the quantity of materials and the amount of capital tied up in the stocks of finished products in the hands of manufacturers, wholesalers, and retailers were lessened.

2. To eliminate the styles and varieties that took more than the strictly necessary amount of material; as, for example, by restricting the length and sweep of overcoats.

3. To eliminate features or accessories which used materials for adornment or convenience, but which were not actually essential to the serviceability or utility of the product.

4. To eliminate patterns and types of product that were less essential to the civilian population.

5. To substitute materials which were plentiful for those that were scarce and urgently needed for the war programme. For example, in numerous instances zinc was substituted for steel and other metals.

6. To discontinue the use of certain materials for unnecessary purposes, such as caustic soda in the manufacture of automobile tires.

7. To standardize sizes, lengths, widths, thicknesses, weights, gages, etc., of materials, parts, and sections by means of which proper strength and durability could be obtained with the employment of a minimum of material and labor in manufacturing and a reduction of the quantity of material carried in stocks of parts and finished product.

8. To reduce the excessive waste of materials in manufacturing processes, such as chrome chemicals in certain branches of the leather tanning industry.

9. To secure economy in samples used in selling the product.

This being an interpretive and appraising history as much as a chronicle, it will be quite impossible to follow the application of these means of conservation through the two hundred and fifty industries affected by "schedules" that were issued or prepared by the Conservation Division. A schedule was the Division's name for a conservation prescription. Behind each schedule were congeries of conferences, discussions, investigations, and conclusions. Altogether they represent the most searching examination of American industry from the standpoint of stark necessity and efficiency that has ever been made. Their effectuation called for the highest degree of diplomatic management, and their promulgation involved the sagacious and general use of all manner of publicity—from circulars to the news and editorial columns of the general press, the pages of the magazines and of the trade periodicals, and to films of the moving-picture theaters. To make conservation go on an enthusiastic, coöperative basis it was necessary to "sell" it to the consumer as well as to the producer, to the dandy and the clubman as well as to the navy and the proprietor, to the primping school girl, the fine lady, and the washwoman. Thus conservation became the intimate and popular side of the War Industries Board, which was otherwise little known and slightly appreciated by the public.

Its ramifications even reached into the stately courses of international diplomacy and brought it to bear on the vanities of woman's dress. The dressmakers of Paris, in the midst of a somber desert of black and repression of the lighter side of life, planned for 1918 fashions that would call for an abundance of materials, which they hoped would loosen the purse-strings of prosperous and as yet unmourning America. M. Jusserand, Ambassador of France, was appealed to. He promptly took the matter up with his Government, which in turn found a way to convince the modistes that the fashions for 1918 should be of the slim silhouette type. So for the practical purpose of saving twenty-five per cent of the material used in women's frocks and gowns, that there might be more material for uniforms and airplane wings and tents and the like, the Conservation

Division brought it about that woman in 1918 should emulate Diana rather than Juno. The fashions thus set have since evolved alarmingly in the three dimensions, and now have passed from the realm of economics to that of manners.

Mars demanded many other sacrifices of women. First-quality steel was denied them for corsets to give it to implements of war. Taking the weight and rustle out of their silks, as supplied by tin, gave three hundred tons of a much-needed metal to war industries. War-time scrimping, as an offset, gave them more thread to the spool. As materials went up, manufacturers had cut down the length of thread to a spool in order to maintain the traditional unit price. Less thread meant more spools, and more spools meant more wood, and more wood meant more space in packing and transportation. By putting the amount of thread on a spool back to two hundred from one hundred and fifty yards, Mr. Shaw saved the transportation space represented by six hundred cars. A small thing, you say. But a car meant more in the war than a horse to King Richard at Bosworth Field. And the affair of the thread spool was but one of 1241 such savings.

Typewriter ribbons are little things, but, by reducing the numbers of colors from one hundred and fifty to five, and doing away with the use of tinfoil and tin boxes for containers of the ribbons, three hundred and ninety-five tons of steel were saved and seven tons of pig tin, to say nothing of the capital and material released by the limitation of the colors.

Even so rugged and commonplace a thing as a farm wagon is frescoed with the differentiations of taste, custom, section, and makers' pride. The farmer has wasted as much on a manure cart as a rich man on a limousine. If you have thought that fashions in vehicles arrived with automotion, consider the niceties of the farm wagon. Going no further than the front and rear gears, it was found that there were almost as many models as there were coal-tar dyes. One manufacturer reported 1736 varieties of gears. Think of the frozen capital, the inert material, the dead storage space, the superfluity of cataloguing, the cumbersome complexity

of production, and the deep crust of useless cost all this involved. A critical examination and review showed that sixteen patterns was the outside limit of necessity.

A like scrutiny showed that the fastidious farmers painfully chose their plows from three hundred and twenty-six sizes and styles; seventy-six were found to be an abundance. They had hesitated over the niceties of seven hundred and eighty-four drills and other planting machines, whereas it was found that twenty-nine would plant all the crops without the loss of an acre or a bushel. In buggies there were two hundred and thirty-two varieties of wheels; four were enough. There were even one hundred kinds of buggy axles, and one would do. And this is only half the wagon and buggy story. The horse-drawn vehicles were as good and as plentiful as ever after these prunings, but there were thousands of tons of steel more for war and a tremendous saving of time, space, transportation, and man power.

In a country of the size and consuming capacity of the United States, many a mickle piles up a mountainous muckle in short order. Take so simple a thing as trace chains. When the Conservation Division began to operate on them, it was found that there were five hundred and four varieties; seventy-two were enough. The twist links and copper finish were eliminated. Insignificant, you would say—these changes. Are eighty five-thousand-ton cargo ships, for which the steel could thus be provided, insignificant? Cutting out the fads in pocket-knives reduced the catalogues of manufacturers from six thousand items to one hundred. Just the saving in the bulky catalogues that fill parcels-post sacks and express cars was enormous, not only for the makers of pocket-knives, but for all industries. Similar paring throughout the hardware trade made it possible for one great wholesaler to reduce by more than half the ninety thousand items in his encyclopædic catalogue.

Reducing bicycle designs and stripping them of furbelows saved 2265 tons of precious steel. A like process in motorcycles indicated the saving of six hundred tons of steel, nine tons of aluminum, thirteen and a half tons of brass, twelve and a half tons of copper, and twelve tons of rubber. By

taking the tin out of children's toy carts and the like, seventy-five thousand pounds of pig tin were saved, and by changes in packing, the freight space of 2325 cars was in the way of being saved. The clock industry was restricted to four alarm clocks, one style of mantel or hanging clock, and two sizes of clock watches. Brass writing pens were abolished, and the styles of steel pens reduced from one hundred and thirty-two to thirty. Eliminating the dozen-package saved 1,800,000 boxes. By reducing the proportion of tin used in Babbit metal for bearings and by using cadmium instead of tin for solder, three thousand tons of tin were to be saved in a year. Reforming the tinfoil industry saved one thousand tons of tin; that of collapsible tubes, about five hundred tons; of silverware, a like amount. The completion of the plans for substituting other material for tinplate in the making of tin cans and other containers would have saved 4680 tons of pig tin and 450,000 tons of tinplate.

The Conservation Division overlooked no economy between the cradle and the grave. Baby carriages were standardized, and the vanity was stripped from coffins. Brass, bronze, and copper caskets were tabooed, and the styles and sizes of steel caskets much curtailed. Even the varieties of wooden coffins were reduced eighty-five per cent. The labor-saving was thirty-five per cent, and in a full year the materials savings would have been 6000 tons of steel, 285 tons of tinplate, 275,000 pounds of copper, 90,000 pounds of brass, 74,000 pounds of bronze, 70,000 pounds of pig tin, 17,000 pounds of nickel, 2200 tons of coal, and 212,000 yards of wool fabrics.

Attention was early concentrated on the necessity of saving wool. The purchases of wool for the army alone exceeded in 1918 the ordinary annual consumption of wool by the entire population, and sixty-five per cent of the raw wool had to be imported. In a lesser degree it was necessary to conserve all clothing fabrics. In men's clothing twelve to fifteen per cent of yardage was saved by eliminating flap and outside pockets, shortening the lengths of coats, narrowing the width of facings, etc. Also, each manufacturer was restricted to ten models of sack suits. Boys' suits models were reduced to three.

Reference has been made to the economies effected in women's garments. Wool was ruled out of shawls and robes, and colors of sweaters were limited. These and other modifications reduced by one third the quantity of wool consumed by makers of knitted textiles. Felt hats were limited to ten colors for men and twelve for women and children. Of stiff straw hats only six combinations and dimensions were permitted. This programme reduced one manufacturer's samples from four thousand to one hundred and forty-four.

The husbanding of textiles was carried back even to the designs and qualities of the goods. The excessive number of designs, for most of which there was small demand, caused the accumulation of enormous amounts of goods in the hands of manufacturers, wholesalers, and the cutting-up trades. Frequent changes of the patterns restricted the total output of the textile machines. Large patterns were wasteful in the cutting. Great savings were effected by limiting the number of designs and sorts of goods. It was found that, by reducing the weight of cloth and mixing reworked wool and long staple cotton with the virgin wool, the latter could be made to go much farther. The reduction in the number and sizes of samples — a seemingly insignificant item — provided cloth for 900,000 uniforms. Leaving the shine off certain rubber shoes saved 30,800 gallons of varnish. Taking the "frost" off automobile tires released considerable quantities of caustic soda to necessary uses.

War is a great consumer of leather. Of shoes alone the army purchased during the war more than twenty-nine million pairs. At the same time the shortage of shipping resulted in a reduction of the imports of hides by nearly forty per cent. An untimely fashion decreed high boots for women and of many colors. The uppers were shortened, colors were limited to white, black, and tan, and new lasts forbidden. In consequence there was a great saving of all of the elements of boot and shoe production. In general, "lines" carried by manufacturers were reduced about two thirds. Incidentally, it may be said that these economies had nothing to do with the standardization of shoe prices, which was about to be applied by the War Industries Board when hostilities ceased.

Substitution was never carried so far in this country as

in Germany, but wood and paper replaced metal to a very large extent, and plentiful zinc was often made to do in place of scarce steel and copper. Many of the substitutions are still with us, and always will be, for in breaking up trade traditions and customs it was found that there were many methods and many kinds and uses of materials that were based entirely on habit and custom. It was also discovered that many of the accepted "can'ts" of industry were only "had-not-been-dones."

The effects of conservation met the citizen at every turn. Besides the articles and commodities mentioned, the bed he slept in, the chinaware of his table, the chairs of his home, the paint on the house, the desks of his office, the hose of his lawn, his electrical instruments and implements, the utensils of his kitchen, the roof of his home, the stove in his kitchen, the furnace in his basement, his talking machine, the books in his library, and many other of the impedimenta of daily life were affected by the conservation programme.

To pursue the trail of simplification and substitution further would be wearisome for the ordinary reader, but he perhaps will understand from what has been said that it soon became an absorbing game with the war service committees of the different industries. They suggested and defined the schedules of changes in their respective businesses. For the first time manufacturers had a chance to strip off the parasitic infestations of production. They were amazed and fascinated by the results. It is said that the economies in the horse-drawn vehicle business thus inaugurated have put profit and new vigor into it. All manufacturers learned a lesson under the tutelage of the Conservation Division that is now standing them and the country in good stead. They are armed with the knowledge and experience to meet the demands for lower prices in a time when competition in prices is more important than competition in varieties of styles and novelty of appearance.

Conservation was applied chiefly to goods intended for civil use, but in many instances standardization was so applied that the goods were suitable for either civil or military use. It was apparent, however, that there was a wide field for conservation in the manufacture of military goods.

To a certain extent such conservation did result from the insistent pressure by manufacturers and various agencies of the War Industries Board for the elimination of refinements and excessive margins of safety and strength for which the military had a great fondness even at the cost of delays in development, slow production, and an unnecessary waste of material. Plans were being matured, just as the armistice came, for a general standardization of army and navy goods that looked to uniformity of design and reduction in the number of models wherever possible.

These plans also contemplated a degree of uniformity between civil and military goods. It was one of the inevitable failures of the supply of the army in France that there was such a variety of models and sizes of almost every sort of army equipment. One outcome was that there was a great waste of transport and storage space. There was also a waste of precious time in designing and producing so many different sorts of equipment, and a considerable confusion in distribution. The army tended to elaborate just when the civil population was simplifying, being obsessed with the idea that perfection and completeness of equipment were of more importance than time. This was partly the result of the observation of the advantage of superior equipment which the Germans had in the earlier stages of the war, partly of the conviction that the climax of the war would come in 1919, and partly of the abundance of funds suddenly placed in the hands of officers who long had been stinted and cramped in the acquirement of equipment.

While the general policy of the Conservation Division was one of pruning rather than of cutting industries back to the roots, several lines of conservation sometimes converged on one industry, and in such industries, as well as in some others, the use of whose products could be deferred, there was a positive limitation of output. The automobile industry was an enormous user of steel, and there was but small opportunity to economize it by substitution or standardization. Moreover, much of the steel was of the high-grade alloys, which were scarce and imperatively necessary in ordnance. The associated tire industry normally consumed seventy per cent of all the rubber used in the United States,

and it was important to reduce the imports of this commodity because of the large amount of shipping needed to bring it from the distant sources of supply.

Another factor was the need of conservation of gasoline. Still another was the large amount of skilled or expert labor absorbed by this industry. Finally, as the industry was one on which the equipment of the army and navy with aircraft and with vehicular transport largely depended, it was felt that there was little danger of disorganizing it by limiting the output for civil use. The automobile problem was one of the conservation fields which became a problem for the War Industries Board as a whole, and even involved other major war agencies, as did all of the conservation problems which involved curtailment.

Even in the narrower sense of the husbanding of materials and facilities, the conservation work overlapped and interlocked with other functions of the Board. In truth, the whole Board organization was marked by overlapping of functions. When Mr. Baruch became chairman, he saw at once that this might be either a strength or a weakness, depending on the attitude of the personnel. Each executive was expected to pursue his duties with this fact in mind, so that there would be no friction over authority disputes. So broad and tolerant were the various executives, and so little concerned in winning individual honors, that an unparalleled degree of harmony and helpful coöperation was realized, with the result that each department was greater and stronger than it would have been in hard-and-fast functional isolation. The Conservation Division was full grown and highly efficient before it was incorporated into the War Industries Board, but after the merger it had virtually the whole of the War Industries Board's machine at its command, and was enabled to view and practice conservation as the complement of the other activities of an agency whose field was becoming the whole of industry.

The amazing thing about the harmony that pervaded the organization was that the executives were all strong, forceful, and outspoken men. Mr. Shaw, for example, was disappointed by the selection of Mr. Baruch for chairman of the Board, and bluntly told him so. Although they had been in

the Government service for a year, under the central authority of the Council of National Defense, they were barely acquaintances and each knew little of the other or his work. Shaw spoke as an impartial critic and not as a partisan. Baruch in no way resented Shaw's position. On the contrary, he asked Shaw to remain at the head of the Conservation Division and assured him that he would have in his work all the authority that he (Baruch) and the Board had. Then the two men sat down and amicably discussed the points of Shaw's objections to Baruch as chairman. The outcome was that Baruch "sold" himself to Shaw "in principle," as the diplomats say, and subsequent experience applied the principle.

The success of the Conservation Division illustrates one of the advantages among some disadvantages that a democracy has over an autocracy in an emergency. Shaw, a person unknown to the Government, had an important idea and a studied knowledge of how to apply it. He and his idea were appropriated by the Government within twenty-four hours after he had come into contact with members of the Council of National Defense. This idea of conservation without exhaustion or destruction, through the voluntary coöperation of the men and industries affected, was so well applied that there is no question that conservation was more judicious and efficacious in the United States than in other countries engaged in the war. As applied here, civilian economy of men, materials, finance, and facilities was a means of strengthening the morale as well as the physique of the Nation.

The Economic Intelligence Section of the Division kept it informed of conservation practices in Germany, France, England, and other countries engaged in the war. The reports from Germany were as significant in the latter months of the war of that country's impending economic collapse as Foch's bulletins were of her military *débâcle*. Monthly analyses of German uniforms foretold the army in rags; the increasing number of "duds," or dead shells, told of the growing inefficiency of the German projectile factories. Other reports unerringly showed that the German steel industry was reaching the end of its rope. A chart was kept up

to date which reflected all obtainable information as to the supply of raw materials in Germany. Month by month the quantities sank, and the inevitable end was seen coming nearer and nearer. A prediction based on this chart and favored by luck foretold the precise day of the signing of the armistice.

What civilians did resentfully under compulsion elsewhere, they here did cheerfully as a high privilege. Lord Reading was so much impressed by the American plan while he was in this country that it is believed that had the war lasted longer Britain would have adopted it, and some of the great industries of England applied it to themselves, of their own initiative. Although in Canada the Government had direct powers of compulsion in effecting conservation, it elected to adopt the Shaw idea of "aid and consent."

The conservation work was conducted with remarkable coolness of judgment at a time when passion ran high and public opinion was cyclonic. There was a clamorous demand for heroic measures. Many earnest patriots could not tolerate the continuation of any business that savored in any degree of luxury or dispensability. They had no thought for timeliness or the complexities of industry and the weaknesses of human nature. They did not consider that to crush an industry before the time had arrived in which its personnel could be transferred to other activities, or its materials economically applied elsewhere, was to injure the economic body and result in waste instead of economy. They did not realize that the humble worker could not always be expected to take the broad and impersonal view that they had. They could not understand that to take away from such a man the opportunity to spend his earnings in amusement and on baubles was to deprive him of the incentive to labor.

These were the people who were always appealing to the Government to do, "for God's sake," this or that drastic thing. They had a sort of tragic conviction that the Nation must gash and torture itself to prove its gravity and attest the solemnity of the hour. Parkman tells us how the relatives of deceased Indian warriors ostentatiously mutilated and racked their bodies to attest their sorrow. Some such thought of proof of national sense of affliction was vaguely

in the minds of the emotional "forgodsakers." The Conservation Division was unmoved by such appeals. At the fitting time it acted with the balanced judgment and cool precision of a surgeon in the operating-room. It used the knife, not to punish or to avenge, but to conserve.

The World War was a wonderful school, but it gave too many lessons at once. It showed us how so many things may be bettered that we are at a loss where to begin with permanent utilization of what we know. The Conservation Division alone showed that merely to strip from trade and industry the lumber of futile custom and the encrustation of useless variety would return a good dividend on the world's capital. It was an amazing proof of what can flow from a detached scrutiny of industry applying the criterion of utility and efficiency. It is, perhaps, too much to hope that there will be any general gain in time of peace from the triumphant experiment of the Conservation Division. Yet now the world needs to economize as much as in war.

In this country it is the savings of the producers rather than those of the consumers that accumulate new capital. Our savings deposits make a sorry showing by the side of those of some other nations, but in no other country do the producing agencies store up capital as they do here. It has been calculated that only one third of the war profits of the great American industries reached the pockets of individuals. Outside of taxes, the rest went into surplus and undivided profits; that is to say, capital. The individual spent his large earnings and profits freely during the war and sold his Government bonds afterwards, so that there was little gain from individual thrift. The Conservation Division opened up a vast field for the exercise of producers' thrift, but to preëempt this abundant source of new capital implies such a close and sympathetic affiliation of competitive industries as is hardly possible under the decentralization of business that is compelled by our anti-trust statutes.

It would seem possible, however, and it is emphatically advisable, that the Government should have some close and intelligent liaison with business that would keep it fully informed as to how in another emergency the experience of the Conservation Division could be applied quickly and intel-

ligerly and thus contribute greatly to the expedition and effectiveness of industrial mobilization. We know now that another great war may be won or lost by celerity of industrial mobilization. To know beforehand just how the community should strip and adjust itself for the test of combat would be a factor of the first importance. It may be that we are coming into a period of international disarmament. Should that be the case, facility of industrial mobilization will be greatly enhanced. A show-down between disarmed nations will be one of potency to arm after the break comes — and nobody has yet had the temerity to say that disarmament is insurance of peace.

CHAPTER XII

CONVERSION: THE METAMORPHOSIS OF INDUSTRY

What France learned — Our own peculiar problem — Making haste slowly — Converting regions as well as plants — Should our industries have been pooled with the Allies'? — The early days of conversion — Peek arrives — Otis goes into action — He converts Baruch — The regional system is born — Conversion by long-distance telephone — Applying the continental vision of industry — Those who also served — Graphic forms of conversion.

IN the World War cavalry became footsoldiers and trudged in the mud of foot transport. Marines fought far from their ships. Paris taxicabs shifted Gallieni's army to the undoing of von Kluck. London buses figured in the supply of the British army. Engineers dropped picks to take up weapons. Naval guns moved on railway trucks and behind gasoline tractors instead of on warships. Soldiers spent more time with pick and shovel than they did with arms, and riflemen discarded their favorite weapon to become grenade-throwers. Throughout the military forces there was adaptation and conversion.

Likewise the industrial army had to be nimble on its feet and mobile in function. No nation could keep in reserve the infinitely specialized facilities and sufficient stores of the supply side of such a war. In truth, its demands were foreseen only dimly. The French were, as always, artillery specialists. Yet they calculated that thirteen hundred rounds a day each would be the limit of consumption of ammunition by the 75's. There were days when single guns of this caliber fired four thousand projectiles each. At the beginning of the war the French were making only fifteen thousand such projectiles daily, but the output had to be pushed up until it was at the rate of 8,400,000 a month. The entire French supply of artillery shells of all calibers was 5,000,000 at the beginning of the war, but before the end the monthly production was 9,000,000. In the final offensive of 1918 the French and American armies together shot away 33,000,000 French shells — an average of 272,500 a day. Every little

shop and even the cottages of France turned to the making of shells. It was by a marvelous conversion and improvisation that France was able to meet the unforeseen demands and stunning loss of a large proportion of its manufacturing industry at the outset of the war.

Knowing of this shifting of industrial capacity by France and also by England, conversion early became one of the popular cries in America. And because every piano and talking-machine factory in the country was not forthwith converted to the making of war machines or commodities, there was a general fear that our leaders had not grasped the industrial implications of modern warfare. There were two excellent reasons why conversion proceeded somewhat slowly in this country. One was that it took time to ascertain what conversions were possible and desirable, and the other was that American quantitative manufacture depends more on machines than on workmen. Our workmen are machine-tenders rather than mechanics. To a degree, conversion in England, and more particularly in France, was one of setting adaptable mechanics to doing something other than they had been doing. But you cannot tell a machine to make something else. You must remodel it or replace it with another.

A group of French workmen who had been making automobiles could almost on a day's notice begin making airplanes, and might have one done within a few days. The process of making standardized parts for final assembly into a whole is incomparably different. The factory may be running weeks or months full blast before a single finished article comes from the assembly room. This was one of the things that mystified our people. They would read that factories were "in production," working day and night, and yet there would be no reports of finished goods; and it is not surprising that the public often thought that it had been the victim of deliberate deception.

To the layman production means goods ready for use. To the quantitative manufacturer production has a technical meaning as distinguished from development. An automobile company, for example, may spend months developing a new model and may even turn out quite a number of sample cars. That is not production, but, when the plant at last begins

making the standardized parts of the new model in volume, it is considered that the factory is in production, though it may be a long time before a single car is in the hands of the dealers. If there are fifteen hundred parts of a given machine, there must first be made a reserve of each one of those parts, and there will be no completed production if there should be any delay or mishap in connection with any of the fifteen hundred items. Thus, a certain contract may from the standpoint of the manufacturer be considered ninety per cent done before a single completed unit has been shipped. The group of mechanics, perhaps, may have built a hundred machines before the great factory has completed one; but, when the assembly room at last begins to function, the factory may send out in a day more units than the group of workers has completed in a month.

Wholesale conversion of manufacturing plants in the early stages of the war would have been as disastrous as too hasty conservation. There would have been a long period of production of nothing, and doubtless many maladroit conversions, necessitating, possibly, reconversions. Preliminary to conversion, it was necessary to make a survey of the resources of the country with regard both to materials and facilities.

The Resources and Conversion Section took over the data and work of the old Industrial Inventory Section (one of the first creations of the Council of National Defense) as one means of obtaining its basic facts, and through its regional organization was able to shape the industrial inventory more practically than formerly had been the case, though the armistice came before its revision of old and collection of new data had been completed.

Allied to conversion of plants was conversion to war objectives of manufacturing centers and regions which, in the haste of placing early Government orders, had been neglected. About sixty per cent of the first orders placed for war goods were given to manufacturing plants in the four States of New York, Pennsylvania, Ohio, and Massachusetts. In value and in tonnage they bulked much larger. The northeastern section of the United States is predominantly the manufacturing region, and it enjoyed the advantage of being near

to Washington. It was but natural that each of the score of Government purchasing agencies should instinctively turn to this region, and there being virtually no thought of the relation between the total volume of the twenty sources of orders and the productive capacity of the favored section — flowing from a lack of centralized control of buying — an overtaxing of every facility of production in this section resulted. Power, transportation, facilities, fuel, materials, labor, and finance were strained to the point of collapse.

Long before there was anything approaching an authoritative and general control of the creation and utilization of facilities the condition had become inextricably snarled. There was not only that general congestion of the northeastern section, but there were innumerable local entanglements in and out of that section. The different supply agencies of the army, the navy, the Shipping Board, had placed orders without reference to or thought of each other. The result was that there was not power, fuel, transportation, or labor enough to go around. Thus orders were many times placed where they never could be filled. Each agency counted on all the local factors of production as available for itself, not knowing that other agencies were doing the same. Even when they were aware of their conflicting plans, the responsibility of each officer for the success of his own job drove him to plan and strive for his own. In this way many brilliant individual achievements in procuring production were at the cost of bitter failures.

The topic of conversion touches on the interesting question of whether the whole matter of America's industrial participation in the common war against Germany should not have been treated entirely as one of coördination, in the sense of complementation and supplementation, of American industry with that of the Allies. This is a subject that popular discussion of the war has hardly ever touched, and students of the economics of the war have not given it more than a passing thought. It will, therefore, come as a surprise that some army men are of the deliberately formed opinion that the greatest mistake of American military-industrial policy — a mistake that is characterized as a blunder that cost billions and hobbled the Allied power — was the failure to

deal with American industry as a complementary part of Allied industry instead of as an integral industrial unit.

What is meant is this: The Allies, especially France and England, had built up the specialized war industries of their countries, during three years of intense effort, to such a point that their capacity was beyond the demand. They reached the peak of production after their armies had reached the peak of numbers, and of consumption. These industries had already made up the ordnance and munitions deficits of the first years of the war, and when we entered the struggle they had only to replace wastage and current consumption by armies which were declining in numbers.

The French army, for example, reached its maximum strength in July, 1915, when it was almost 5,000,000 men. By the spring of 1917 it had declined to 4,400,000, and at the signing of the armistice was down to 4,143,000. On the other hand, the munitions capacity was growing steadily. When the war began, France had 3696 75's; at its end, despite loss and wastage, she had 6555. In 1914, the French army had only 288 pieces of heavy artillery; in 1918, 5477.¹ But that is not all. The French capacity for artillery production became so great that it not only made up the enormous deficits indicated and met the current depreciation, but was able to supply ten thousand guns to the armies of the other allies. The French airplane capacity was 62 a month in 1914, and 2068 a month in 1918. England was in much the same situation. France, alone, was perfectly competent, with benefit instead of injury to herself, to have supplied all of the artillery and, probably, all of the munitions, for an American army of any size that could have been sent to France. From the viewpoint of the industrial capacity and efficiency of the Allies what the addition of millions of American soldiers to the Allied armies required was not more facilities for the manufacture of war goods, but of more materials for existing facilities to utilize. Because we could not sooner get our ordnance and munition plants into production, the American army in France did, in fact, fight wholly with French guns and projectiles and largely so with

¹These and preceding figures regarding French ordnance and munition production are from M. André Tardieu's book, *The Truth About the Treaty*.

French airplanes. If we had undertaken to provide the materials, the French could have so supplied our armies indefinitely with guns, projectiles, tanks, and airplanes.

Instead of following this policy of supply integration with the Allies, we set out to create an absolutely independent supply scheme. Not only that, but we developed a strong tendency to take away from the Allies the ordnance and munitions plants that they had built up in this country. For months plants that had been producing for the Allies produced for nobody. Those who hold that the failure to fuse our industrial efforts and capacities with those of the Allies was a great economic blunder point out that had we done so there would have been no necessity for the tremendous disturbance of the normal industry of this country that resulted from conversions and the creation of new facilities for the manufacture of ordnance and munitions.

It is further pointed out that we should have been saved the vast expenditures in such plants, which the unexpectedly early termination of the war rendered practically futile. Certain specialized war goods — for example, explosives — would have been made in this country on a tremendous scale, under a programme of inter-Allied economic coördination, but for the most part the contribution of American industry to the war effort would have been an increased production of what it was accustomed to produce, with a saving of much of the loss of time, energy, and money spent in conversion and on new plants.

Again, the army would have been relieved of the tremendous burden of the complex ordnance problem, involved in the virtual creation in this country of a mammoth new industry, and thousands of officers, enlisted men, and civilian personnel would have been released for active service. We spent about \$7,000,000,000 for ordnance, a large part of which represented amortization of plants, and still, because of the brevity of the war, fought it with French ordnance, outside of small arms and machine guns; the latter being, by the way, one of the things that we should have made in this country under the coördination plan.

To admit that the omission to integrate our industrial effort with that of the Allies was a blunder would not be to

say that it was avoidable. National pride might have moved public opinion successfully to oppose such an undertaking, and there undoubtedly would have been clamorous opposition to the expenditure of vast sums abroad that might have been spent at home.

Even the wise arrangement by which the gap in domestic production was filled by having the Allies, particularly the French, provide guns, projectiles, and airplanes for the first two million men has been persistently represented as the imposition of an intolerable burden on an already overtaxed France. As a matter of fact, it was a positive benefit to that country.

One of the principal objections to the production of American munitions in Europe was the necessity of transporting the bulky raw materials overseas. It would have meant vastly increased shipping.

In the case of powder, from ten to twelve pounds of raw material would have to be transported to produce a single pound of finished powder. For artillery and shells the shipping demands would have been still more serious.

It is also to be said, in direct opposition to the contention that the neglect of Allied industrial integration was a profound error, that there was always a menacing possibility that France might have been inundated by the Germans, and her industrial potency annihilated, leaving America, had Allied economic unity been effected, without facilities at home or abroad with which to continue the contest.

The present writer's judgment is that, while the early termination of the war undeniably resulted in a tremendous loss because of the lack of coördination between American and Allied industry, it would have been most unwise to have assumed that the war would end as soon as it did.

However, this was a matter of national and military policy that was entirely outside the domain of the War Industries Board. It had to operate under an adopted plan of independent equipment and supply of the American armies; but it did concern itself with Allied economic coöperation adapted to the chosen policy, and it was always ready to hold back American preparation when to do so strengthened the hand of the active armies of the Allies. When the War

Industries Board came into its own, it had a herculean task in the internal coördination of American industry.

It goes without saying that conversion of industries began as soon as the war began, but for a long time it was not a considered policy. It was a hit-and-miss affair of individual initiative by civilians, army and navy officers, and various sections of the War Industries Board. There were no guiding channels. Manufacturers who wished to engage in the production of war goods came to Washington and were caught up in an endless game of tag that led them from bureau to bureau and finally dropped them spent and angry. Sometimes a manufacturer would have the luck to stumble into an office that was crying for the help he could give, but in most cases the offer and the need did not join. Moreover, the whole field of industrial adaptation was dependent on the slow formulation of a programme of projected requirements.

It was not until late in November, 1917, that the War Industries Board got to a definitive decision with regard to the orderly study and direction of conversion. It then resolved to create the office of Industrial Representative, and Mr. George N. Peek, then vice-president of Deere & Company, Moline, Illinois, was appointed such representative by Chairman Willard, on the advice of Mr. Legge. The duties of the industrial representative were defined as advising with Government agencies regarding the location of new facilities and the diversion of existing ones from their accustomed activities; to coöperate with industries to procure necessities for war and for public welfare, and to study "future war requirements and from time to time make such recommendations to the chairman as the exigencies of the situation require." Mr. Peek's function included conversion, but was more extensive. He was to be a sort of generalissimo of industry under the War Industries Board, to direct the conversion, the conservation, and the sagacious concentration of industrial facilities, old and new, keeping in mind the dual purpose of efficiency for war and public welfare and preservation for peace.

Mr. Peek reduced his problem to its simplest terms, and decided that its solution required the convergence of requirements by the Government in a central agency in touch with

authorized committees of industry. The complement of the committees of industry would be specialized agencies of contact on the part of the central agency, which was, of course, the War Industries Board. The specialized agencies were the commodity sections, which had their beginnings in the subdivisions of the work of the Committee on Raw Materials early in 1917. This committee, it should be remembered, never identified its own functions with those of the coöperative industrial committees with which it worked. It worked with and through the committees of industry, but they were not its committees.

As has been pointed out before, this early idea of specialized Government representatives, dealing with particular commodities in contact with authorized representatives of the corresponding industrial groups, was the alpha and omega of the final form of the War Industries Board. It was simplicity itself, but it took a year for it to come into domination of the War Industries Board, and then only when the chairman of the old Raw Materials Committee became chairman of the Board. Mr. Peek contributed powerfully to the advancement of the idea of specialized contact between Government and grouped industry, but, owing to the drifting status of the Board for several months, following his appointment as industrial representative, it was not possible positively to accomplish much in the direction of ordered conversion.

In the reorganization of the Board by Mr. Baruch, Mr. Peek was made Commissioner of Finished Products, succeeding Mr. Brookings, who became chairman of the Price-Fixing Committee. In this capacity Mr. Peek had an opportunity to apply directly his ideas of the joining-up of Government purchasing and supply agencies with corresponding committees of industry—through commodity sections and war service committees. At the same time the reorganization gave opportunity for the development of the functions that had been entrusted to Mr. Peek as industrial representative. They remained under his general supervision, but were particularized.

It should be remarked that the title of Commissioner of Finished Products was somewhat of a misnomer. This



FINISHED PRODUCTS DIVISION OF THE WAR INDUSTRIES BOARD, GEORGE N. PELK, CHAIRMAN

department did not include all finished products; neither did it actually include all of the conversion and adaptation task. C. A. Otis, president of the Chamber of Commerce of Cleveland, and a banker of that city, was placed at the head of the Section of Resources and Conversion. His selection was another instance of how men with ideas made their niches in the War Industries Board. Mr. Otis had taken the lead in Cleveland, even before the United States entered the war, in a successful endeavor to concentrate in the Cleveland district the making of all the parts and accessories of the characteristic manufacturing products of that part of the country. This work had been prompted by the confusion encountered in responding to the demands of the Allies. The object was to cut out wasteful and time-consuming cross-hauling, and generally to integrate industrial processes not domiciled in a single plant.

Such an experience met the requirements of the War Industries Board, for in connection with unit conversion Mr. Baruch was planning to meet the problem of regional congestion of production with territorial decentralization. In a way Mr. Otis and his associates had been building up a little war industries board of their own in Cleveland. Like nuclei all over the country were what the Board needed — not only to promote the diffusion of war industry, but to break up the jam of administrative burdens that was overwhelming the central offices. Under the new organization authority, being definitely placed in the hands of the chairman in the first instance, was by him conveyed to division and section heads. A step further would be to project authority, not only functionally, but territorially. Thus arose the regional system under Mr. Otis's direction.

"I'm sold," said Baruch at the conclusion of his first interview with Otis.

The latter then suggested that some great organizer, such as President Farrell of the United States Steel Corporation, be put in charge of the new enterprise.

"No, you have the idea, and I think you are the fellow to carry it out," was Baruch's answer. "You get your winter clothes and come to Washington."

Otis and Peek worked out the plan of nineteen (later

twenty-one) industrial regions with an "adviser," representing the War Industries Board, in each. These advisers were usually men associated with local chambers of commerce and fully conversant with industrial facilities and personnel in their district. They knew men and facilities. They knew what was feasible and what was possible. They had a commendable local interest, but it was remarkable how completely they subordinated the local to the general. If the full story were ever told of how these local men sometimes prevented their home-town plants or business men from getting Government patronage that they were not competent to handle, a number of gentlemen would find it desirable to seek new habitats. On the other hand, they developed and encouraged worthy local enterprises of conversion or new organization that might never have got a hearing in Washington.

Should regional patriotism, however, advocate a steel plant in Salt Lake City or in Maine because there happened to be some convertible buildings on hand or some idle labor available, it collided with the watchful Otis in Washington. Regional integration of industry was one of his great purposes — the territorial concentration of the final form of manufacture, with the production of materials, massed labor, ample power, and adequate transportation with a minimum of long hauls and the elimination of cross-hauls.

With the coming of the regional organizations the day was gone forever when smooth persons armed with a roll of blue-prints could talk themselves into contracts they were not competent to perform. If they came to Washington, a few minutes' telephone talk between Otis and Trigg in Philadelphia or McAllister in Cleveland indicated the way out for them. But if the men and the project were genuine, the same quick intelligence started them immediately on their way to business. It was the purest sort of application of private business methods to the Government's business. It was a case of an old friend in the person of Otis asking a friend or acquaintance in Oshkosh or San Francisco or Chicago, "What kind of a fellow is Sam Perkins? Can he change his washing-machine plant into a balloon factory, and if he can is he the sort that can make a success?" It

was the informal personal intelligence method of the *camaraderie* of business which is worth more than volumes of reports and stacks of card indices.

The section, like so many of the War Industries Board departments, was composed centrally of representatives of the war agencies in addition to Mr. Otis and his staff, the latter being John A. Kling, Charles H. Anthony, Edward F. Buhlman, W. T. Rossiter, and Irving H. Taylor. Each regional adviser had a committee made up of one representative of each of the principal war industries in his territory, with special members to look locally after priorities, production stimulation, and statistical information. As has been shown, they coöperated with regional agencies of the war-making bodies and thus created local war industries boards. Originally conceived of as specially charged with the function of conversion, they were rapidly decentralizing the work of every division and section of the Central Board.

The army took up the zone or regional system of decentralization. The Shipping Board, the navy, the Fuel Administration, the Food Administration, etc., had their local or sectional representatives in many if not all parts of the country. These local chiefs and the War Industries Board's regional adviser and his helpers began to meet and counsel together. The former soon found that they had a local war industries board to help them in their local work, just as the Government as a whole had the Central Board in Washington. Thus, the whole contact of Government with business was oiled and flexed and articulated. Personal ties were established, aloofness was banished, rigidity and formality were blown away.

As in the regions, so in Washington. Otis did not spend his time writing long letters and making tedious reports to the Ordnance or Quartermaster Departments. Unhampered by uniform or rank, he established reciprocal relations of confidence and understanding with men like General Hugh Johnson and General Williams, and so through the medium of business men, talking and acting like business men, industry and the Government were brought together in understanding, sympathy, and effective effort.

The Otis organization aimed at getting the efficient pro-

ducers into Government work, keeping the inefficient out and distributing the load of production for war over the whole industrial body. It did not, any more than any other part of the War Industries Board, make purchases or let contracts. What it did was to put itself into an unassailable position of being able to send to the proper contracting or purchasing agency men who were competent for the work they sought to do; or, conversely, direct the latter to the men and plants they needed. It thought out for the men in uniform the problems of location in respect of personality, finance, power, transportation, adaptability to conversion, and so on. It thought, too, not from the myopic point of view of Washington on the eastern seaboard, but with the continental vision of all industry. It thought for industry as well as for the Government.

The old Washington maze, in which good men were lost for weeks, was destroyed. The manufacturer whose business was being curtailed and conserved into a mere skeleton could now come to Washington and go to Otis, or, locally, for example, to Boston to Stuart W. Webb, and get a quick and intelligent answer to his question, "For what kind of war work is my plant suitable, and do you want it?"

On the other hand, if the initiative came from the Government, Otis and his organization could summon the right man and say to him: "Jones, the time has come for you to forget Jones. You must lay off making wash-boilers and take to making helmets for the boys in France."

To some men it was necessary to say: "It's too bad, old man, but your plant cannot be used. There's nothing for you to do but lock the doors and wait till the storm blows over."

Almost invariably the manufacturers took their sentences like Spartans. Their formula of acceptance was something like this:

"All right, Otis; that's war. I haven't a complaint. You have given us every chance. We'll shut the old shop up and at least release some good men for essential work."

One such man closed up his woodworking plant and devoted himself wholly to selling Liberty bonds during the rest of the war.

A by-product of the regional decentralization of the War Industries Board — for the regional organizations came to represent all phases of the Board's activities — was that all over the country there were little knots of business men who got an intimate view of the Government's colossal problems. They became less destructively critical, and began to think that, considering the size and strangeness of its task and inherent limitations of officialism, the war Government was surprisingly efficient.

Reference was made in Chapter X to the Facilities Division, and the reader will experience some confusion of understanding of the line of demarcation between this division and the Resources and Conversion Section. Both were in the same administrative department of the Board, but they were separate, and yet the definitions of their functions reveal a wide overlapping. In the language of a memorandum prepared by Mr. Peek, their common chief, they were "inseparably connected." In any other than such a loose and adaptive organization as the War Industries Board, they would have fouled each other. The records show that they worked together hand-in-glove.

The Facilities Division was more general and the Resources and Conversion Section more particular, but both functioned particularly and generally, and both had to do with the problem of conversion or adaptation. The division specialized more on the Government's future requirements of facilities and on studies of how to meet them. It dealt with the source of demand, and endeavored to modify and formulate it in the light of what was practicable and possible. It sought to mould new enterprises into conformity with conditions. The army, for instance, would say, "We must have additional facilities for making gun forgings." Mr. Bush and his associates would study the proposal first with a view to ascertaining whether any existing facilities could be utilized; and, second, if new construction was necessary, with a view to seeing that it should not interfere in any way with existing plants.

Care was taken that the labor supply should not be drawn from going factories, that housing should be adequate, that power could be provided, that local and external transporta-

tion was suitable, that the proposed location should be outside of the congested region, that fuel and raw materials were available. In fine, the division sought to avoid errors at the start; its representative in the War Department was cognizant of new projects from the moment of their inception. It was a sort of practical counsellor to the war-waging agencies. The latter stated their requirements in terms of facilities and the former told them how to realize them. This sometimes necessitated a veto of army or navy construction plans. The division did not act positively so much as negatively. It would not, for example, undertake to tell the army where it should place a contemplated plant, but it would tell it where it must not place one.

The fact that the Resources and Conversion Section had a regional organization indicated a rough line of division of function. To a very considerable extent the section obtained the data on which the division based its advice, recommendations, and inhibitions, and assisted in their application. The division was more concerned with facility requirements at their source and the section more with converting facilities to the meeting of requirements that were already in the stage of orders. The section had but little to do with new facilities and much with adaptation of old. The one dealt largely with facility proposals emanating from the Government; the other largely with such proposals emanating from private sources. Through the division the need sought its fulfillment; through the section a potential facility was drawn toward a known need.

One result of the work of the Facilities Division was that the army, after having drafted thousands of skilled men, was compelled to look to the ranks for labor for new plants, in order to avoid the practice, all too common in the early days of the war, of robbing one plant of its labor to fill up the rolls of another.

The division was also instrumental in developing new sources of labor, such as female labor. It contributed to the checking of the merry-go-round of labor which caused hundreds of thousands of restless men to put in a large part of their time traveling from an old job to a new one in a very dementia of mass migration, which congested passenger

traffic and turned manufacturing establishments into mere junction points where the victims of the wanderlust changed trains. The writer does not know that any one has ever tried to estimate the labor loss that followed the colossal turnover of personnel in the war industries, but much was wasted at this capacious bunghole that was saved at many a tight spigot.

Mr. Bush, with his wide experience as a railway executive and as a manufacturer, had a comprehensive understanding of the interlocking factors and remote reactions of new facilities in the midst of a great tension. As a volunteer he had originally approached the Government's war-time problem from the railway angle, and had early advocated supreme Government control and administration of traffic, instead of Government operation of the railways. He was drafted into Mr. Vauclain's sub-committee of the Council of National Defense on army and navy artillery, was subsequently at the head of the War Industries Board's section of forgings, guns, small arms, and ammunition for the last; and in the last months of the war became chief of the Facilities Division. His public and private experience peculiarly qualified him for the management of facilities development, which was most intimately related to transportation.

The concentration of facilities control in one head, which should have been one of the first things undertaken at the beginning of the war, came at a time when the situation was desperately involved, and the termination of the war soon afterwards found him in the midst of his task.

Conversion of manufacturing plants from one sort of goods to another is not a simple thing. If nothing but varying materials and varying machines were involved, it would be different. But to alter to a degree that affects fundamental processes and invalidates the experience and skill of workmen, the specialized knowledge of technicians and the commercial deftness of the manager, is a delicate if not impossible business. Any successful business man will tell you that his "organization" is more important than his plant. An organization turned to an unfamiliar thing is little better than no organization. So conversion, to accomplish one of its ends, of obviating the construction of

new plants, had to determine whether or not proposed conversions were sound in principle.

The carpet manufacturer could not make shells, but he could make blankets and duck. The dredging contractor who was ambitious to make airplanes, but could not, could excavate berths in shipyards. The makers of refrigerators could turn to hospital tables. Horseshoe makers could not make automobile tires, but overnight they could take to making trench picks. The toy manufacturer thought he could make surgical instruments, but came into his own in packing-cases. When curtailment hit the stove business, it was found that the idle plants could be turned to making grenades and trench mortar bombs, which are largely casting jobs. The corset-maker found that he could easily master belts for the Medical Corps and fencing-masks. The piano factories and furniture men got their chance in the fuselages and wings of airplanes. The makers of automobile motors took to the Liberty engine like a duck to water. Even the talking-machine people landed right side up with facilities adaptable for the making of seaplanes. Shirtless shirt factories came in handy for sewing mosquito netting into required forms; and pipe-organ factories, strangely enough, were very good at making mosquito netting. Yacht-makers were excellent on flying boats, and manufacturers of air-brakes found they could master Le Rhone motors. These are but samples out of thousands of industrial adaptations to the requirements of war.

The Resources and Conversion Section reversed the old and awkward method of making the American mountain come to the Washington Mahomet. It was taking Mahomet to the mountain. Washington, too, was no longer the monumental puzzle whither men went to help and remained to dodder. The puzzle resolved itself, and gave to each man the key to his part. On the one hand, the new section gave light and leading to the engrossed army and navy officers, and, on the other hand, it guided the resources and facilities of the Nation to orderly concentration on war industry. Like a sorting-table in a fruit-packing plant it received miscellaneous industry in mass and distributed it, according to its nature, to the great tasks in hand. Some

industries were preserved for the civilian population, some were virtually suppressed for the period of the war, some were spurred on to renewed and increased activity in what they were doing, and others were shifted from strong to weak spots in the industrial structure or from dispensable to indispensable production. The War Industries Board, as a whole, directed industrial strategy; the Conversion Section concerned itself with industrial tactical evolutions.

CHAPTER XIII

DISBURSING FIFTEEN BILLION DOLLARS: THE INTER-ALLIED PURCHASING COMMISSION

The New World succors the Old—A golden key for the Allies—Establishing a central control—Legge's way—The traditional obstacles—Mastering the common problems of supply—A great coalition at work—Fifty-two million dollars for one item—Northcliffe, Brand, Tardieu, and Tozzi.

CANNING said long ago that he had raised up a New World to restore the balance of the Old. When America threw the weight of her finance and her industry on the side of the Allies, she upset the economic balance between the two worlds. Europe felt for months the tread of her armies, but the world still reacts from the shock of America's economic offensive. The troops who poured into France in brown human rivers, filled the gaps in man power, and gradually turned the balance of preponderance, were but two millions added to ten millions. In terms of soldiers we contributed to the Allied cause about twenty per cent, but economically we contributed the potency of the wealth of half the world. The result was that all the old channels of commerce and finance were diverted or reversed with an ensuing confusion that still bedevils mankind in its trade relations.

America rushed to the support of the Allies her unsapped strength of man power and at the same time she applied her economic power through the arms of the Allies. She not only added her own new armies, but kept the old armies going. There was even a period of hesitation in which it seemed that the one way in which we could render effective assistance was by putting every ounce of our strength into the reinforcement of Allied supply. It was thought that to raise huge armies in this country would be but to divert from the Allies the vast sources of supply they were already enjoying; thus crippling them during the long period before our new armies could be effective.

The Allies themselves originally inclined to this view, but

its fallacy was exposed when the British army in the greatest disaster in its history groped its way in shattered fragments back to Amiens, gasping for the reserves that were non-existent. President Wilson, as early as May, 1917, had decided that the American effort must be bi-lateral, and in an address to the people in that month he prophetically declared that creating and equipping a great army would be "the simplest parts of the great task to which we have addressed ourselves." In the same address he said that we must not only equip our own forces on land and sea, but that we must supply ships by the hundreds and materials "to help clothe and equip the armies with which we are coöperating in Europe, and to keep the looms and manufacturing there in raw materials; coal to keep the fires going in ships at sea and in the furnaces of hundreds of factories across the sea; steel of which to make arms and ammunition both here and there. . . ."

We placed the resources of America at the disposal of the Allies on a parity with ourselves, and gave them a golden key to the warehouses of the land in the form of almost unlimited access to the credit of America through the medium of colossal loans of such magnitude that they may not be repaid in a hundred years. In doing so we multiplied their already large drain on our resources and facilities at the very moment that we ourselves were subjecting them to an unprecedented strain.

It was very much as if we had authorized the Allies to recruit their armies from our men of military age at the same time that we were raising great new armies.

It was evident that there must be some sort of central control; first, to prevent further disastrous competitive conflicts between the Allies, such as were common before we became a party to the great combat; and, second, between them and us. The latter developed first, by reason of the fact that the Allies had already built up large sources of supply in this country.

As has been noted elsewhere, our military men, concentrating their attention on their own problem of creating and supplying great armies, took the position that they must be served first. They not only applied this principle with

respect to the current requirements of the Allies, but ruthlessly took over their plants that were erected for and were in production for the Allies (some of which they virtually had paid for through orders at prices that allowed for amortization of plant costs) on contracts placed before the United States entered the war. They further complicated the situation by preëmpting the supplies of raw materials, even though those could not be utilized for many months or even longer.

The taking-over of plants that had been making projectiles and guns for the Allies, although in some cases a sheer waste of the most profligate kind, was not so serious a matter, on the whole, as it might have been, because the Allies had continuously increased their domestic facilities until they were in excess of their requirements. Nevertheless, the stopping of production for them, long before plants could be utilized for the equipping of the American forces, was a blunder that has never been adequately explained. It resulted in the dissipation of manufacturing organizations that had been laboriously built up and in months of non-productiveness. The most flagrant case, perhaps, is that of the Minneapolis Steel and Machinery Company, which was successfully engaged, in coöperation with a forging plant, in producing British six-inch shells. The works were closed for six months and the organization virtually wrecked. There was no reason why they should not have been allowed to continue on the British contract while "tooling up" for the American contracts. In fact, they were shut down before the ordnance people had even begun to design the shell they were to make for the American artillery.

Originally it had been the intention of the Allies to form a sort of committee, sitting in London or Paris, that would primarily determine among themselves the form and precedence of their participation in American supplies. This intention was fully realized by the foreign missions represented on the Inter-Allied Munitions Council in the last few months of the war.

The Inter-Allied Purchasing Commission, as it was called, was established in August, 1917, about the time the War Industries Board was created, and was composed of three

members of that Board, whose aggregate duties composed the whole field of supply, namely, Messrs. Baruch (Raw Materials), Lovett (Priorities), and Brookings (Finished Products). Although it was primarily designed as an instrumentality of the Treasury, which did not wish to disburse money to the Allies faster or in larger amounts than their necessities required as determined by ability to procure goods in this country, its chief function soon became one of industrial management, which inextricably involved it with all the functions of the War Industries Board. It was fundamentally related to the general problem of requirements, and eventually, in the final form of the War Industries Board, it was affiliated with the Requirements Division.

Mr. Baruch, who was then at the head of the Raw Materials Division of the War Industries Board, called on Mr. Alexander Legge, vice-president and general manager of the International Harvester Company, of Chicago, to assist him generally and particularly in his duties as member of the new Commission. Mr. Legge had had a large experience in foreign trade and was very familiar with American industry. A little later, Mr. Brookings asked Mr. Legge to act in a similar capacity for him with respect to finished products, as the line of separation between raw materials and finished products was a very hazy one. He was then designated as general manager of the Commission. His office equipment at first consisted of one edge of Mr. Baruch's desk. In view of the fact that his duties involved the adaptation of both American and Allied requirements to the available resources and facilities, a member of the British High Commission calculated that his staff would ultimately comprise many more than the fourteen thousand people of the British Ministry of Munitions.

"I might take the fourteen part of that number," said Legge.

He was not quite right, but his staff never exceeded one hundred and fifty. Its smallness was due partly to the fact that the War Industries Board's duties were such that all contracting, ordering, and the supervision of production, inspection and delivery, etc., remained in the hands of the

War and Navy Departments and other bodies. For the rest, it was due to the loyal coöperation of American industry which performed, through its war service committees and other associations, and through individual industries, many of the tasks that would otherwise have fallen to the Board.¹

Owing to the difficulties inherent in the situation of a great industrial nation transforming its productive organization to meet the requirements of war, so radically different from those of peace, the task of the Inter-Allied Purchasing Commission would have been hard enough at best. But being without any more real authority in the beginning than any other part of the War Industries Board at that time, it was placed in a very awkward position. There was nowhere else for the commercial and industrial representatives of the Allies to go in their quest of action. They had voluntarily given up their own previous system of buying in this country and they represented Governments which were accustomed at home to having their orders obeyed as much industrially as militarily. Yet the Allied Purchasing Commission and the War Industries Board had no authority. All the Commission could do was to argue, beg, and implore the army, navy, and Shipping Board people to let the French have this, the British that, the Italians something else, and so on. It was a maddening position.

At first, so far were our military authorities from the coöperative spirit that, instead of releasing to the Allies any of the facilities that they had taken away from them, they were disposed to (and often did) take possession of any that Mr. Legge might uncover. In effect, we said to our Allies, "Help yourselves," indicating with a sweeping gesture the illimitable resources of a continent; but at the same time negating the invitation by helping ourselves first to everything in sight.

The Inter-Allied Purchasing Commission saw clearly that to sacrifice the efficiency of the armies already contending

¹It is pertinent to note here that the total expenditures of the Council of National Defense and the War Industries Board for the war period amounted to but \$771,200. This included \$200,000 for the erection of the Council of National Defense Building, in which the War Industries Board was housed. It is doubtful if any governmental war agencies of similar importance, in any country, operated under such amazingly small overhead. E. K. Ellsworth disbursed the funds for both bodies.

with the common foe in France and elsewhere for the super-equipment of an army not yet in being was a strategic error for the like of which a field marshal would have been court-martialed. In their humiliating task of begging for concessions which they should have been in a position to command, members of the Commission had to iterate and reiterate the cogent argument that, if the Allies should collapse while America armed, our armies might have to fight for a landing-place in Europe and continue the war alone. By the cumulative results of persistence and repetition, the Commission gradually brought the military authorities around to the view that the war was to be fought not by an American army alone, but by that army as part of a great coalition.

Perhaps it was not that our officers were so blind as not to recognize the implications of alliance, but more the bad practice resulting from the lack of internal coördination. Each procuring officer was so placed and bound that officially he could do nothing but grab for himself and his. If in the rush he bowled over associates and allies, it was not his to pause or reason why, but to go madly on with the grabbing. In this sort of procedure, the more efficient the agent, the greater the damage.

We here come back to that hydra-headed traditional refusal of the American people to prepare for the future. A small complement of officers who had been precluded from getting ready even in a small way for war was diluted twenty to one with civilians temporarily in uniform whose special, technical, and commercial qualifications only served to make them more efficient than the regulars in the grand game of grab, each for his own. Under these circumstances it was a harder task to obtain recognition of the principle of equal, if not preferred, treatment of the Allies' economic needs than it was afterwards to fill them.

The explanation of the ruthless competition of departments of our Government with each other and with the Allies was well set forth by an energetic and achieving young army officer, who had upset the carefully laid plans of months of another department by requisitioning certain facilities. When Mr. Legge had pointed out to him the consequences of his action, he answered:

"Well, I guess that is true, but I am put on this job of mine with imperative instructions to get these goods by a fixed date, and there will be no excuse for me if I go back to my chief and say that it was out of consideration for the other fellow that I failed to deliver. My instructions are to go and get, and I go and get regardless of how it hurts or whom it hurts. I must do it. I have no authority to consider the other fellow's problems."

Despite the enormous difficulties the Inter-Allied Purchasing Commission steadily gained mastery of the epic problem of keeping open and enlarging the American sources of supply for the Allies, simultaneously with the satisfaction of the vast new demands of arming America. The problem was blended with the general problem of the War Industries Board. That Board never for a moment subordinated Allied needs to those of the American forces. On the contrary, every effort was made to secure precedence for the requirements of the Allies in all the days while the American armies were training; and later the needs of all the armies of the great coalition were met according to the demands of the common effort.

A decision by the Inter-Allied Purchasing Commission was a decision by the War Industries Board. It was necessarily a part of the Board's requirements machinery, and when the Requirements Division was set up, Mr. Legge became its head. He was succeeded by James A. Carr as general manager of the Commission, but the work remained under Mr. Legge's general supervision, and, of course, under the authority of the Commission. The manner in which what was originally conceived of as a sort of Treasury advisory board regarding loans to the Allies became part of the warp and woof of the War Industries Board is an illustration of the absorptive and adaptive nature of that body, which was always ready to fit into all the niches and crannies of things to be done, without waiting for hint or command. An undone job unclaimed by others was always a signal for initiative on the part of the Board. Could the mood and temper of war-time prevail among people and leaders in peace-time, a general form of government as mobile and as initiative as the War Industries Board would approach the ideal.

The members of the Commission met regularly with the authorized representatives of the Allies in Washington, thus forming an Inter-Allied Council on American economic contribution to the reinforcement of the Allies. So far as the Americans were concerned, there were no intrigues and no finesse in the proceedings of these meetings. And, it is but fair to say, if the representatives of the Allies had at first purposes of promoting individual interests at the expense of their associates, they were soon abandoned.

These meetings, daily at first and semi-weekly later, soon became judicial conferences. Each national representative stated his requirements and narrated his troubles with respect to pending orders. Among the literally thousands of articles and commodities the Allies were getting in this country, an immense number were for things of which there was no shortage. In such cases a statement of requirement was merely *pro forma*, but in the basic commodities and in many sorts of finished goods, where there was a shortage, it became a question of allocating the supply or the facilities *pro rata* or according to superior need. Each national representative stated the position of his country with regard to an article or commodity and then the conference discussed the relative importance of needs with the common cause as the sole criterion of judgment. It was no unusual thing for the representative of one nation, after hearing the presentation of the position of another nation, to waive or postpone his own applications.

Many of the decisions this council was called upon to make could better have been made, perhaps, with fuller knowledge and understanding by such a body meeting near the theater of war and the governments of the Allies; but it had the advantage of being in the American scene, and of understanding the problems of production and delivery that arose on this side of the water. In Europe the belief persisted that the United States was both a huge storehouse of inexhaustible accumulated products and a manufacturing miracle, with transport facilities equal to instantaneous compliance with every possible demand. The members of the purchasing commissions of the different countries, who were resident here, understood how different were the facts. They

knew, too, how their goods, delivered at the seaboard, were forever accumulating in terminal yards and on wharves, for lack of shipping to move them; and why, therefore, it was often useless to press for immediate satisfaction of the direst needs. But the Commission and the War Industries Board, with all the machinery of its functional, administrative, and commodity divisions, was always eager and ready to meet as best the conditions permitted every requirement approved at the conferences.

Aside from its function of financial controller of Allied purchases for the purposes of the Treasury Department, the Allied Purchasing Commission was in practice the whole War Industries Board functioning for the Allies. To undertake to follow the detail of the management of the economic recruiting of the Allies in America would be merely to follow through a particular phase of the War Industries Board's work, with this difference that the Commission proper had also to deal, as the guardian of the Allies' interests, with the Shipping Board for marine transport, with the Food Administration for foods and feeds, and with the Fuel Administration for fuels. So far as the materials and facilities needed by the Allies fell within the domain of the War Industries Board, and even when without, that body throughout all its parts was the authorized instrumentality of their realization.

The relations of the Commission to the purchasing agents of the Allies were analogous to those existing between the War Industries Board and the corresponding agencies of the American war-making media. The agents of the Allies attended to their own purchases just as the army officers did. The Commission sometimes told them what they must do and what they could not do, in a general way. It also reviewed their contracts to assure itself that they were not being victimized. They were assisted, guided, and protected, but the Commission did not undertake to pass on the validity of their requirements any more than the War Industries Board sought to tell our army what sort of equipment it should have. They were assumed to know their own business. The Commission's business was to see that, since they were spending borrowed American money, they were not mulcted, that

they received the degree of preference they were entitled to, having in mind the end in common, and that their course was made as smooth for them as possible. Beyond those friendly limitations they were free agents and made or marred their own records. Yet the fact that the Inter-Allied Purchasing Commission regulated the flow of credits from the Treasury gave the War Industries Board a general power of direction and manipulation that it did not have over the purchasing agencies of our Government. It had more authority at the source, at least in the way of advice that would command respect. In a very true sense it was the disbursing of the ten billions of dollars that the Allies received from the United States.

The men who measured the flow of this golden flood had had large experience in big business, but Mr. Legge, for example, was amazed at the colossal buying powers for war. One of the first orders he had to deal with was one for the British Government for \$52,000,000 worth of six-inch gun shells. Fifty-two million dollars in one order for one item! When we consider that this approximated one third of the normal annual net earnings of the world's greatest corporation and more than the entire cost of the Revolutionary War, we begin to understand what fifteen billions (including private credits), so placed that it reversed the old international position of credits and debits, meant. The largest national debt in the world before the World War was that of France, which was about \$6,000,000,000, virtually all held at home. A single national bond issue of a billion dollars was never known before the recent war, and such an international credit between governments as ten billions would have been considered preposterous in sensational fiction. Is it any wonder that the outpouring of American wealth into the scale pans of the Allies disturbed the balance of the world more than the armed weight of two million soldiers?

Yet the War Industries Board, in supervising for the Allies the expenditure of the cost of twenty-five Panama Canals, was attending to only about one third of the total of its work as measured in dollars. All the costs of the Federal Government since the Revolutionary War were not equal to the amount spent and loaned by the Government of the United

States in the World War. In a few months the War Industries Board had to adapt national resources and facilities to a flood of expenditures so vast that it can be glimpsed only by such comparisons.

The foreign representatives on the Inter-Allied Purchasing Commission were without exception men of integrity and high ability. Each Government maintained a representative in America with the official title of High Commissioner. In the earlier days of the Inter-Allied Purchasing Commission, Lord Northcliffe was the High Commissioner of Great Britain. He was succeeded by Sir Charles Gordon, whose representative was the Honorable R. H. Brand. The French Government was represented by a High Commissioner in the person of M. André Tardieu, who maintained a residence in Washington and had an extensive and highly trained staff. The Italian Government was represented in the person of General Tozzi.

James A. Carr succeeded Mr. Legge as business manager of the Commission, and W. M. Reay, A. L. Bostwick, James C. Leddy, and F. E. Penick acted as assistants.

The Inter-Allied Purchasing Commission performed its great work without the slightest hint of corruption, and the efficiency of its performance was undoubtedly on a par with American military coöperation with the Allies.

CHAPTER XIV

AMERICA AND WORLD WAR ECONOMICS: THE FOREIGN MISSION AND INTERNATIONAL EXECUTIVES

Buttressing the world's economic structure—Baruch demands reciprocity from the British—The Foreign Mission lays its plans—The British Government meets Summers—Austen Chamberlain and Winston Churchill coöperate—Seventy-five million dollars saved—Summers takes charge of a meeting—Conserving steel for war—The story of two million shoes.

So commanding was the economic strategic position of the United States in the Allied coalition that it was inevitable that the American economic control should tend to become that of the whole alliance. Considered as an agricultural, mining, lumber, and manufacturing unit, the United States approached more nearly to self-containment than any other nation. In no other country, available as a base of supplies for the Allies, was it possible for them to satisfy so large a proportion of their needs.

In some commodities, such as steel and copper, the American sources were virtually the only ones available to the Allies outside their inadequate domestic productions. In other commodities, such as foodstuffs, that were available in large surplusages in distant British dominions and in South America, the extreme shortage of shipping made it necessary to put a tremendous strain on North American supplies, for owing to the shorter route the limited transport facilities could render greater service. Under these artificial conditions the United States, which had almost ceased to be an exporter of meats and wheat and its products, became for a time again an exporter of them in unprecedented volume.

The United States was also the one member of the anti-Teutonic coalition that was in a position to impel the economic assistance of the politically neutral nations. In the case of the Scandinavian countries, for example, the United States was in a position, as the price of that modicum of supply that was necessary to their existence, to assist in the diversion of such exportable goods as they had, to the Allies,

and to tighten the embargoes against trade with Germany. In the case of Chile, the shifting of its source of supply of manufactured goods and financing from Europe to the United States made it possible for the United States to secure control of the Chilean nitrates without which the war could not have continued.

Thus the United States in reality played a triple economic part in the war. It had to meet its own civil and military needs, an indispensable proportion of those of the Allies, and such part of the requirements of the neutrals as would make them economically contributory to the Allies. In a very large way the United States was the cohesive force which kept the whole economic structure of the world from falling into ruin. In the final analysis the major part of this tremendous task fell to the War Industries Board. When at last the chairman of the Board became the arbiter of priority — that is to say, the allocator of the products of American industry — he automatically tended to become the central, though undesignated, distributing authority of the internationally derived commodities of the entire world outside of the Teutonic alliance.

The growth of this international power and its efficient application necessitated that the War Industries Board should be ably and authoritatively represented in Europe in close touch with the Inter-Allied Munitions Council and with those British agencies which thitherto had dominated the control of certain materials that were obtainable chiefly within the British Empire or were British-owned. Another consideration that demanded the projection of the War Industries Board into Europe was the need of far more economical use of shipping in the interest of the common cause. A third was the need of seeing to it that American materials, often supplied to the Allies at the cost of much deprivation and hardship to American industry of a non-war nature, were husbanded and faithfully used by the Allies for war and not for private trade purposes. A fourth need of representation abroad was the conviction that the American Expeditionary Forces were calling for or were receiving certain kinds of supplies far in excess of current or reasonably anticipated requirements. Finally, the A.E.F. had need of

business advice and judgment in its extensive purchases in Europe, which could hardly be expected to be available to it without outside assistance.

It is difficult for Americans to understand that in the fourth year of the World War, and even after the United States had been a party to it for upwards of a year, the British control of production, distribution, and prices was far weaker and much less extensive than like control in the United States. It is something of a shock, too, to find that throughout our first year in the war our Government in its foreign requirements was treated by the British Government precisely as if it were a British civilian in the matter of prices. In such commodities as the British Government had put under price-control there was one price for the Government and another for civilians and private industry. The United States Government had paid the civilian's price, though from the first the United States had made it an invariable rule that all prices established for governmental buying should also prevail for civilians and for the Allies.

The prime purpose of the Foreign Mission was to put an end to this inequality. This purpose was frankly disclosed to Lord Reading, the British Ambassador at Washington. He opined that the Mission was a very disturbing factor in international relations. Mr. Baruch informed him, with the directness of a business man, that the United States could no longer tolerate the continuation of such an inequity as that we should lend the Allies immense sums with which to purchase goods at a restricted and controlled price, whereas we were denied equal price treatment by them. This meant that unless reciprocity were effected American financial support would be withdrawn from the Allies.

A further step was the insistence that the British should take under price-control certain important commodities that they were still permitting to run wild. These proposals were unpleasant to the British Government, for the coalition war machinery of England was highly responsive to the power and demands of its commercial interests; and the economic side of the war was considered from a materialistic angle undreamed of in America. It was this fact that accounted for the anomaly of no price-regulation at all

of some scarce commodities and of two prices for others.

The American War Industries Board was thus directly involved in British trade and industrial control when it sent out the Foreign Mission. It was a bold and hazardous enterprise, and Lord Reading was well advised to say that it was a disturbing factor in international relations. It went, however, in no Quixotic quest, but firm of purpose, clear of comprehension as to its objectives, and fully supported at home. Both President Wilson and Secretary of the Treasury McAdoo were whole-heartedly behind the undertaking. There was no chance that the Mission would find itself out on a precarious limb. It was anticipating trouble, but it was well armed.

Any one who attempts to interfere with any of the vested interests of John Bull, especially in his own home, will not find interest in life lacking. The Foreign Mission was advised by old heads in European diplomacy that, however much value the indirect and soft-pedaling methods of the traditionally disingenuous manner of dealing with international matters might have in ordinary times, shirt-sleeves diplomacy was precisely the sort for the hour.

The Mission, being mostly composed of American business men accustomed to direct dealing and impatient of delays, received this admonition with satisfaction. At its head was L. L. Summers, member of the War Industries Board and technical adviser to the Board, who combined a vast and mobile knowledge of the chemistry, physics, and economics of war, in practical application, with a quick and lucidly analytical mind and abundant energy.¹ Chandler P. Anderson, a lawyer of extensive diplomatic and international experience who enjoyed a personal acquaintance with officials of the French and British Foreign Offices, was counsellor and adviser to the Mission. George N. Armsby, vice-president of the California Packing Corporation, of San Francisco, and chief of the Tin Section and also a member of the Priorities Committee of the War Industries Board, was specially charged with the subject of tin. Paul Mackall, assistant sales manager of the Bethlehem Steel Corporation, was the steel

¹Mr. Summers's rôle in the War Industries Board will be discussed in Chapter XXI.

man. A. M. Patterson, president of the Textile Alliance, and chief of the Foreign Wool Section, was the wool authority. Henry W. Boyd, president of the Armour Leather Company, was the leather expert. Arthur D. Whiteside, president of the National Credit Office, New York, a member of the Wool Section, had general charge of the Mission's statistical matters. Edward Allen Pierce, of the brokerage firm of A. A. Housman & Co., New York, was business manager. Lucius P. Ordway, president of the Crane-Ordway Company, of Minneapolis, and a member of the Priorities Committee, was the Mission's representative on the Inter-Allied Munitions Council. John Hughes, president of the American Sheet and Tinplate Company, and member of the American Iron and Steel Institute, was associated with Mr. Armsby on tin. Frederick K. Nixon, president of Nixon, Walker & Tracy, New York, assisted Mr. Patterson in textile matters. Dr. Lincoln Hutchinson, professor of Commerce of the University of California, was the non-ferrous metals expert.

Through the President and the State Department, it was arranged that the Mission should have such a diplomatic status that, while having the cordial support of the American diplomatic and war trade services, it would have full authority to act directly, thus effecting a saving of time and gaining the advantage of forceful contact with the responsible war executives of France and England.

The War Trade Board had its representatives, with plenipotentiary credentials, associated with American embassies and ministers throughout the world, and was in a position to be and was of the greatest assistance to the Foreign Mission. This was especially true in regard to matters with which it had been incidentally dealing before the Foreign Mission took them over. Its representatives knew the ropes and the key men in the Governments of the Allies and the neutrals.

Thus there was extended into international relations the War Industries Board's methods of expediting business by direct and frank dealings between Government representatives who were experts in their particular commodities and the delegated committees of industries. It was, moreover, essential that, since the chairman of the Board delegated absolute control of the foreign relations of the Board to the

Foreign Mission, it should be in a position to acquaint itself directly with all the facts and factors that would determine its policies and practices. Long-winded diplomatic correspondence, circumlocution, and procrastination were thus avoided.

About the time the Mission sailed, it was found that in a strict legalistic sense the then available funds of the War Industries Board could not be used to defray its expenses. This fact was later discovered by a lynx-eyed member of Congress during one of the gossip committee hearings that enlivened Executive performance during the war. Judge Albert C. Ritchie, general counsel of the War Industries Board, and at this writing governor of Maryland, was testifying as representative of Mr. Baruch who was then in Europe. A colloquy something like the following ensued:

The Member: "How much did the Foreign Mission cost?"

Judge Ritchie: "It cost \$63,752.25."

The Member: "Are you aware that there was no authority for such an expenditure?"

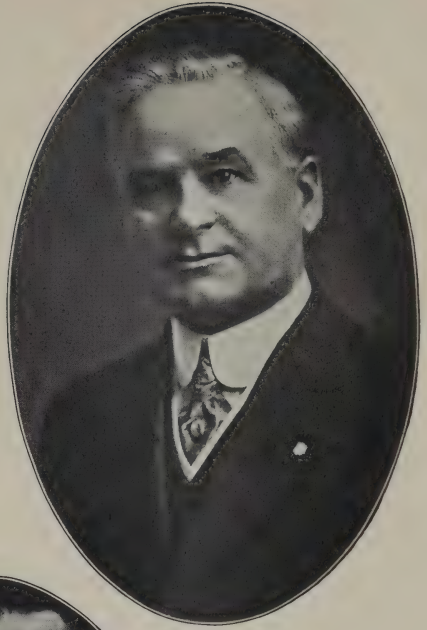
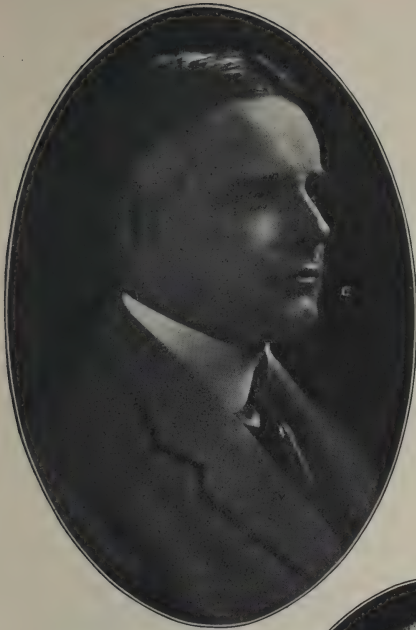
Judge Ritchie: "Yes, sir."

The Member: "Have you any explanation to offer?"

Judge Ritchie: "There was no expenditure of Government moneys. Under the circumstances there was nothing for Mr. Baruch to do but pay the bills himself. The Mission had to go."

The Foreign Mission aimed at the creation of international executives (as the most satisfactory method of control of a number of commodities of which the supply was insufficient and whose sources were largely or chiefly outside of the United States) similar to the nitrate executive, which had been established previously, as will be related later. The commodities whose control was definitely contemplated in this manner when the Mission went abroad were tin, jute, rubber, manganese, tungsten, leather, platinum, flax, wool.

Other commodities were tentatively under consideration. Prior to or aside from the creation of such executives, the Mission sought its ends through contacts with the Inter-Allied Munitions Council, the British economic control committees, the French and British Ministries of Munitions, shipping control agencies, and the A.E.F. The three objects in view



ALBERT C. RITCHIE

General Counsel of the War Industries Board;
now Governor of Maryland

HUGH FRAYNE

Member of the War Industries Board
representing Labor

ROBERT S. BROOKINGS

Member of the War Industries Board and Chairman
of its Price-fixing Committee

with respect to each commodity were (1) to assist the Inter-Allied Munitions Council in determining the actual needs of the respective nations; (2) to obtain such a control of the sources of supply as would insure a maximum of production; and (3) to control prices through the elimination of competition among the Allies.

Connected with the last was the particular American purpose of securing price-reciprocity from the British, whether an international executive was set with respect to a commodity or not. In all these matters the chief difficulty, as indicated above, was that the British control committees were chiefly private committees of industry acting in a governmental capacity and with one eye frankly on their private interests. The committees that controlled these commodities were under the Allied Munitions Council. The Americans took the position that the chairman of the Steel Committee should be an American, and that, in the case of the proposed-international executives, the headquarters should be in Washington of such as might be set up in commodities of which the principal supply came from the United States.

Everything the Americans contended for was in the nature of insurance that the Allies should act squarely with and reciprocally to the attitude of the War Industries Board, which at all times treated America's economic resources as Allied resources. Probably the only international executive that would have had its seat in Washington would have been that of leather and hides. It does not appear to have been the intention to establish international control in such things as copper and steel, which were overwhelmingly of American origin and, therefore, dominated by the War Industries Board for the general good.

Immediately after arriving in London in midsummer, 1918, the Mission asked the various committees of the Munitions Council to undertake price-control of various commodities. This request was promptly rejected by the British chairmen of those committees.

The next step was a direct appeal to the British Government and a declination by the Americans to join the committees until they were thoroughly governmentalized, their position being that, as official representatives of the American

Government, they could deal only with agencies of like authority. Austen Chamberlain, Minister without portfolio, was put in charge of these matters. He was sympathetic and actively coöperative and the status of the committees was promptly altered, conformably to the American plan.

The Americans then joined the respective committees and renewed their request for a new method of commodity control. Again they were denied, and again they appealed to the Cabinet, with plain intimations this time to representatives of the Government that this appeal was an ultimatum.

Jute, which is an Indian product, both as to the raw material and the textile, was in great demand in the United States for such purposes as bags for nitrate and for wrapping many kinds of war materials and implements, in addition to ordinary uses. The British made the argument that they could not interfere with the free play of the Calcutta market in jute, because the Government of India was separate from the British Government. The American reply pointed the general ultimatum.

"We regret to learn that that is the position," said Summers for the Americans, in effect, "because, being under the impression that the Indian Government was subject to the Imperial Government, we have been executing orders from the British Treasury for the shipment of silver to the Indian mints. Now that we learn that the two Governments are independent, we shall feel free to withhold further shipments of silver, assail Indian currency in the markets, and purchase our requirements of jute in the depreciated currency that will result."

Mr. Chamberlain saw the point without explication, expressed apprehension that the alternative American plan would create a panic and close the Calcutta Exchange, and asked for forty-eight hours' delay in the inauguration of the alternative policy of getting jute at reasonable prices. The Cabinet at once reconsidered the jute question, determined on Government control of that material, and invited the Americans to be represented on a special board which was established to decide what prices should be.

As the Foreign Mission saw the situation, Chamberlain and Winston Churchill, Minister of Munitions, whole-heartedly

supported the American contention, but were powerless to take the initiative because of the commanding influence of the Manchester and Aberdeen spinners, who owned the Indian jute mills and were more interested in their profits than in efficient international control of jute.

The ice having been broken, the Americans next succeeded in having tin — which had been controlled, in conjunction with rubber, by a committee of the British Board of Trade, which was virtually a committee of the tin and rubber industries — separated from rubber and placed under an international executive committee. Tin comes principally from the British Straits Settlements and the Dutch East Indies. The tin executive established a price for tin which was enforceable in the Straits and stopped all buying in Batavia. The Dutch refused to meet the executive price, but, being thereafter without a market, their price soon broke to the established level. It was calculated that the new price meant a saving of \$75,000,000 a year to the United States alone, to say nothing of the Allies.¹

As an actual purchasing agency the Foreign Mission had no authority, for it was simply a subsidiary body of the War Industries Board, which, though it might conduct preliminary negotiations as a corollary of its advisory powers, and virtually, if not actually, shape contracts, was without power to execute them. The effectuation of the international executives necessitated firm purchasing agreements on the part of the respective nations. In this emergency the United States Steel Products Company acted most patriotically, and when the tin executive was created bound itself to take and pay for the tin allocated to the United States. Subsequently it delivered this material according to the requirements of the different purchasing agencies of the Government as directed by the War Industries Board, being then reimbursed; but without profit, commission, or pay for its services.

The coolness of the British members of the then forming committees of the Munitions Council continued. The Americans found that, although the completion of their organization had been delayed pending the arrival of the Mission,

¹The results of the Foreign Mission's labors will receive further consideration in the chapters relating to commodity sections.

there was no disposition to confer with them regarding the chairmen. They were particularly sensitive regarding the omission to consult with them regarding the chairmanship of the Steel Committee which, they thought, should be assigned to them without question. However, the day of the organization meeting of this committee arrived without any suggestion that there should be an American chairman. Mr. Summers was greatly concerned and acted in a manner that was decidedly disconcerting and entirely in the "it-isn't-done" category.

He boldly took the chair himself, declared the purpose of the meeting, and announced that, inasmuch as America was furnishing its allies with more steel than their own entire production, the permanent chairman of the committee, in all propriety, should be an American. Accordingly, as chairman of the American Mission, Mr. Summers nominated Paul Mackall for permanent chairman.

"There being no objection," proceeded the amazing Summers, "I will declare Mr. Mackall chairman." There were doubtless mental objections aplenty, but none was audible.

"Will you kindly take the chair, Mr. Mackall?" proceeded Mr. Summers — and that settled it. Whereupon he left the meeting to Mr. Mackall and proceeded about his other business.

That evening the secretary of Winston Churchill, Minister of Munitions, called on Mr. Summers to say that the Minister would be very glad to confer regarding the chairmen of all the committees.

It was about this time that Bonar Law while at a dinner-party said to the remarkable head of the Mission: "So you are Mr. Summers? Well, you have been the most talked-about man in the British Cabinet for the past two weeks."

The British Government, it seems, naturally hesitated to disturb the affairs of the great industrial interests that were supporting the Coalition Government, but when the Government's hand was forced by the dominating American partner it was relieved of responsibility to these interests. Mr. Summers was so confident of the essential soundness and righteousness of the American position that he even told

Lord Reading that, if necessary, he would go before the British and American publics with a candid statement of the situation.

The chairmanship of the Steel Committee enabled the Foreign Mission to find out just how the Allies were utilizing the immense amounts of steel they were receiving from America at the cost of very serious dislocation of American industry. Mr. Summers and Mr. Mackall, now having an official international standing, were in a position to secure reports and personally to inspect steel plants, which they did in both England and France. They were in a position to enforce the use of American steel for necessary war purposes and to see that French and British steel was used in the same way, and not diverted to ordinary commercial purposes. There was a great temptation for the British to use American steel for war purposes and devote their own production to manufacture for post-war trade. Similar intimate knowledge was obtained concerning the disposition of copper and other materials that were being supplied by America at a sacrifice.

The British were persuaded to grant their Government prices in their price-controlled commodities to the American Government. In the item of wool, chiefly originating in Australia and South Africa, this amounted to a saving of \$45,000,000 on a single order.

The war came to an end before any international executives, besides those of nitrates and tin, were established, but the cordial spirit of coöperation that the British controlling agencies developed, after a period of stiffness and frigidity, resulted in much the same thing, though a number of other executive committees certainly would have been established. It is only fair to say that, although the Foreign Mission encountered very determined opposition at the start from the business interests that were in the saddle in England, they enjoyed the frank support of numbers of influential persons who freely conceded that the American programme was purely an Allied programme, wholly unselfish and entitled to the support of impartial judgment.

Complete consummation of international control, thus creating a monopoly of buying, would have saved hundreds

of millions, if not billions, to the Allies, had the war continued for another year. This saving was important, not only as an item of expense, but in relation to the international monetary situation, as it would have enabled the Allies to keep at home large amounts of gold which otherwise would have been exported in payment of the excess prices.

Aside from the concentration of the buying and controlling power of the Allies, which the Foreign Mission was so contributory in bringing about, it was of the greatest value as a general European relations department of the War Industries Board. It gave our Government what might be called a selling agency in Europe in contradistinction to the buying agencies that the Allies and some of the neutrals maintained in the United States. It gave the Board its own sources of information with which to check the requirements statements of the various high commissions, and thus introduced a new factor in the determination of requirements.

An illustration of the benefits that flowed from the manifold activities of the Foreign Mission is the story of a contract for two million shoes placed in England by the A.E.F. The British authorities asked for special allocations of leather and other privileged treatment, saying that this contract was a great hardship to their boot and shoe industry. It was awarded to the British factories because it was represented that they could give quicker delivery than American factories, and the price was higher than it would have been for the latter. Mr. Boyd found on investigation that deliveries would not be made even approximately on time and that American shoes of a better quality could be delivered much more promptly. Armed with this information, Mr. Boyd went to France and acquainted the Supply Department of the A.E.F. with the facts and received authority to cancel the contract. When the shoe contract was again used in London as a stalking horse for preferred consideration for British industries, Mr. Boyd created consternation by stating that the Americans, realizing what a burden the shoe contract was, had secured authority to cancel it. And he thereupon handed a cancellation of the contract to the chairman of his committee.

In October, Mr. Legge, accompanied by Pope Yeatman,

head of the non-ferrous section, and Irwin H. Cornell, chief of the lead and zinc section, were dispatched to Europe to reinforce the Foreign Mission for a time. The alarmingly growing shortages in some commodities and other changes in the industrial situation in America made it advisable to give the Mission the benefit of authoritative personal accounts thereof. Mr. Legge and his associates took with them a mass of statistics regarding shortages, and other data, but the armistice was signed a few days after their arrival in Paris. The statistics immediately became obsolete, for overnight deficits turned to surpluses, and in the general rush to liquidate commitments the Americans learned that the thrifty Allies had often salted down considerable surplus stores of some materials whilst clamoring for more at any sacrifice. Some interesting confrontations followed, amusing to the Americans and embarrassing to the Allies.

Just as the Mission was preparing to return to America, Colonel House asked its coöperation in preparing data regarding the industrial status and requirements of that section of France that had been held more or less damaged by the Germans. As the Mission then comprised about a dozen industrial experts, it was well equipped for a rapid survey and hasty recapitulation of the situation, which was promptly made. It remained in Paris until after President Wilson's arrival, but, when it was found that economic questions were not at the top of the Peace Conference agenda, Mr. Legge and others returned to the United States.

He was hard at work in his private affairs in Chicago when he received a summons by cable from Mr. Baruch, who had become the President's economic adviser in the Peace Conference, to get together a party of specialists and hasten to his assistance in drafting the economic section of the Treaty. Including Mr. Summers, who had remained in Europe, this staff of economic experts was made up of Mr. Legge; Dr. Frank W. Taussig, then chairman of the United States Tariff Commission; Charles H. McDowell, formerly Director of the Chemical Division of the War Industries Board; Frederick K. Nielsen, later the Solicitor for the State Department; Bradley W. Palmer, of Boston, a lawyer

who had been sent to Paris by the Alien Property Custodian; John C. Pennie, of New York, a noted expert in international and American patent law; and J. Bailey Brown, of Pittsburgh, an expert in patents, trademarks, and copyrights. Mr. Baruch and Thomas F. Lamont were the American members of the Economic Drafting Section. Professor Allyn Young, who was independently attached to the Peace Commission, acted as Mr. Lamont's alternate. The work of this section is no part of the history of the War Industries Board, though the American part of it was largely the heir of that body's experience;¹ but this reference to it is required in rounding out the account of the Foreign Mission.

The Foreign Mission, being in direct and constant communication with and in the full confidence of the parent body, the latter was enabled to act in instant response to the varying demands of the war from day to day. It has already been told how American ammonia was traded for Spanish mules, and how, on word from Mr. Summers regarding the gravity of the approaching exhaustion of the French projectile reserve in the fall of 1918, the Lackawanna and Carnegie steel mills were instantaneously thrown into the breach with such gratifying results that one more name was added to the list of those who won the war. The work of the Foreign Mission was a giant's stride toward the realization of the mobile determination and execution of the industrial strategy of war.

Sir Philip Gibbs² relates with what joy the British regiments, "with their backs to the wall" at the northern end of the Allied line in March, 1918, welcomed the French cavalry, galloping their panting horses through clouds of dust, "followed by divisions of blue men in hundreds of blue lorries, tearing up the roads, and forming a strong blue line behind our thin brown line." A little later these men in blue were withdrawn, as quickly as they came, to assist in the first of those hammer-blows on the Marne that

¹Those readers who may be interested in an intimate account of the origin of the economic portion of the Treaty of Versailles would do well to read *The Making of the Reparation and Economic Sections of the Treaty*, by Bernard M. Baruch. Harper & Bros., New York.

²*Now It Can Be Told*. Harper & Bros., New York.

shattered the *Weltpolitik* dream of Germany. So the men of the War Industries Board visualized a centralized control of the industrial resources of the Allied world, as a swift shifting of industrial divisions to meet the successive crises of the war. To them there was drama comparable to that of the battle scene in the swift shifting of twenty thousand sweating toilers in Homestead and Buffalo, their rows of glowing blast and open-hearth furnaces and their rumbling, monstrous rollers, to the making of steel for the 75's of France galloping to victory if only the shells would hold out.

CHAPTER XV

THE CONTROL OF LABOR

The human understanding of labor — Obtaining workers for war industries — Salvaging waste man power and materials — Gompers in the war — His call to labor — Scrutinizing the I.W.W. — Some early history — The Taft-Walsh Board — The War Labor Policies Board — Employment management — Labor after the war — Priorities in labor.

In the preceding chapters we have seen how the War Industries Board practicalized the relations of government and industry by invoking the assistance of capital and management. We come now to an account of how it concerned itself with the third factor in production — labor.

Following the sagacious example set by the Council of National Defense in making Samuel Gompers a member of its Advisory Commission, the War Industries Board from its beginning had a member charged with the consideration of labor problems, Mr. Hugh Frayne. Very properly, he was of labor, but just as capitalists and managers were used as instrumentalities of the Government in controlling capital and management, so Mr. Frayne's experience and ability were applied to the consideration and control of labor in the triple team of production.

Strictly speaking, Frayne was not on the Board to represent labor, but to manage it. There is a labor element in every commodity, a labor factor in every price. Labor is sometimes, indeed, considered as a commodity — as an ingredient of production. But it is unlike other commodities in that it is vital and human. To get the most out of it, it must be sympathetically and understandingly managed, just the same as with the capitalist and the business man. Labor in the United States is quite as patriotic as the employer, and the patriotic appeal was equally powerful with it, but labor must have its hire, and that was subject to extreme fluctuations during the war. It was limited in quantity; hence it was subject to priority regulations and essentially involved in price-fixing. No

requirements programme could be drafted intelligently without due allowance for the labor factor. Conservation could not get far without the coöperation of labor, and the problems of conversion directly concerned the susceptibilities of the workers. A War Industries Board without a labor member would have been a very lame and ill-balanced agency. It would have fallen into a capital error, comparable to that of the Food Administration, which dealt with feeds and foodstuffs without taking the farmer into its decisive counsels.

The creation of the War Labor Administration, with the Secretary of Labor as administrator, prior to the reorganization of the War Industries Board, in the spring of 1918, made unnecessary the setting-up of any administrative machinery for labor matters within the Board. Mr. Frayne was, therefore, relieved of a burden of administrative detail that would otherwise have fallen to his office. He was free to meet the labor problem at the source, and prevent friction by foresight. And he had the leisure to emphasize the labor factor in all the industrial contacts of the Board. He was an active and important member of the Price-Fixing Committee, a member of the War Labor Policies Board in behalf of the War Industries Board, and his office afforded a direct and ever open channel of effective communication between the Board and the War Labor Administration. Like so much of the other work of the Board, a large part of the performance of the Labor Division resulted from informal conferences. The war labor news was mostly of general policies, and adjudications of open controversies by the Labor Administration. Little was known of the continuous adaptation of industrial policies and the tedious appraisal of the labor factor to prevent or nip in the bud labor troubles.

Most of the policies and problems that came before the Board were recognized as having a labor element, as well as elements of price, priority, facilities, requirements, etc. By this forethought much industrial controversy was avoided. As time went on, and the general authority of the Board grew, and it became supreme in priority and the final repository of the power of commandeering, there was a corresponding expansion of the power and influence of the

Labor Division both in Government departments and in the industrial world. Mr. Frayne held no less than two hundred and fifty-five conferences with representatives of labor and five hundred and fifty-five with employers and chiefs of Government departments and bureaus. Besides the adjustment of disputes, determination of matters of wages, labor management, and the like, all of the industries that were in contact with the War Industries Board grew into the habit of appealing to Mr. Frayne for help in their supply of labor. He became their special friend at court with the United States Employment Service. It is reasonably safe to say that through Mr. Frayne's initiative one hundred and twenty-five thousand workers were obtained for war industries, mostly in the way of meeting special emergencies.

While Mr. Frayne was specially charged with seeing that labor was equitably treated, his associates on the Board and the employers with whom he came in contact unanimously testify that he acted first of all as a good citizen, giving the first consideration to the demands of country as against those of a special interest.

Aside from its general duties as the Board's Department of Labor, the Labor Division conducted a work which was in the nature of conservation, under the sections of War Prison Labor and National Waste Reclamation. At the head of this division was a committee made up of Dr. E. Stagg Whitin, chairman of the executive committee of the National Committee on Prisons and Prison Labor; W. J. Spillman, chief of the Office of Farm Management, Department of Agriculture; Anthony Caminetti, United States Commissioner of Immigration; John J. Manning, secretary of the Union Label Trades Department; Dr. Charles H. Winslow, Assistant Director of Research, Federal Board for Vocational Education; Edwin F. Sweet, Assistant Secretary of Commerce; and naval and army officers.

The first task of this section was an investigation of the Base Sorting Plant, Inc., which had a contract with the War Department relating to waste materials. This investigation resulted in the cancellation of the contract, with, it was said, a saving of many millions of dollars to the Government. It

then undertook the creation of a system of methodical saving and reclamation of waste throughout the army and navy, the Government departments, and civil life.

Waste man power was found in large numbers of men of German birth, who had volunteered for or were inducted into the army. It was not thought advisable to send them into active service, and they were given the privilege of an honorable discharge. Many refused to avail themselves of this privilege, and arrangements were made to employ them in manual labor for the army, thus releasing eligible men for active service. Similar action was taken with respect to conscientious objectors, soldiers physically unfit for active service, and military prisoners. In this connection war camp gardens were encouraged. The army was persuaded to accept discharged convicts whose offenses were not treason, felony, or infamous crime. Special efforts were made for the employment, chiefly in agriculture, of such discharged prisoners as did not enter the army. Interned enemy aliens were put to work on the roads. With the assistance of local authorities and, in some states, of special laws regarding vagrancy and idleness, thousands of tramps, bums, and loafers were put to work.

The waste labor in corrective institutions all over the country, if not otherwise employed, was turned to the reclamation of waste material. The studies of the section led to the estimate that the waste material of the Nation, if thoroughly reclaimed, through the use of waste labor, would represent a saving of a billion dollars annually. Local committees were forming in every county in the country to interest the public authorities in this sort of saving and otherwise promote it. As the end of the war approached, Congressional action was sought for the authorization of the use of prison labor in producing supplies for the army and navy.

Through the section's initiative the army gave special attention to the utilization of food and clothing wastes. Between January 1 and October 31, 1918, nearly eighteen million articles of wearing apparel were renovated and returned to service in the army. In the single month of June, 1918, there was a saving of twenty million dollars in

the equipment of eighteen thousand soldiers who went to France entirely outfitted with reclaimed equipment, which had formerly gone to junk dealers for a song. Of other materials the salvage for further use by the army amounted to a value of six hundred and thirty-three thousand dollars and the proceeds from the sale of such materials were six hundred and six thousand dollars. In addition the utilization of army garbage in the same period brought in three hundred and thirty-nine thousand dollars.

The relations between the Labor Division of the War Industries Board and the War Labor Administration were so intimate and so interwoven that it is necessary to a symmetrical presentation of Government relation with industry during the war to give some account of the latter. At every turn the War Industries Board found itself dependent on the coöperation of labor.

The Council of National Defense realized the importance of the labor factor in war industry from its very inception, and there resulted a general governmental policy of scrupulous regard for labor's interest. Whatever the capitalist and the manager from their point of view may have to say in condemnation of the generous consideration given to labor by the Government throughout the war, and however much they may be correct in holding that many of the present complications of relations between organized labor and employers are the direct result of the somewhat paternalistic policy assumed by the Government toward labor, it was a wise war policy. With Samuel Gompers, president of the American Federation of Labor, assigned to the chairmanship of the Labor Committee of the Council's Advisory Commission, the great initial planner of the industrial side of the war, labor could but feel that it was an equal partner in the war with all other factors. Other labor leaders, following Mr. Gompers's lead, with but few exceptions viewed the war as a common enterprise of all Americans, coöperative rather than autocratic. Practically all the basic policies regarding labor relations during the war were laid down by the Labor Committee, and it was the outcome of its advice that the War Labor Administration was set up. As control of all industrial matters more and more passed from

the Council to its child, the War Industries Board, the central advisory function likewise passed from the Labor Committee to the Labor Division of the Board.

Mr. Gompers called a conference of labor leaders as early as February 28, 1917, at which it was decided that it would be wise to have organized labor take a definite public stand in regard to the approaching war. Accordingly, Mr. Gompers called a meeting of the executive council of the American Federation of Labor on March 9th, which was followed three days later by a meeting of the members of the council with one hundred and forty-eight representatives of national and international labor organizations affiliated with the Federation of Labor, five departments of the Federation, and five labor organizations not affiliated with it. Among the declarations of labor's attitude adopted by the meeting, the following is most reflective of the war spirit of organized labor:

We, the officers of national and international trade-unions of America, in national conference assembled in the capital of our Nation, hereby pledge ourselves in peace or war, in stress or storm, to stand unreservedly by the standards of liberty and the safety and preservation of the institutions and ideals of our Republic. . . . We, with these ideals of liberty and justice, herein declared as the indispensable basis for national policies, offer our services to our country in every field of activity to defend, safeguard, and preserve the Republic of the United States of America against its enemies, whomsoever they may be, and we call upon our workers and fellow citizens, in the holy name of justice, freedom, and humanity, to devotedly and patriotically give like service.

The writer well remembers the dramatic and obviously sincere manner in which, in a room in the Munsey Building in Washington, Mr. Gompers read to the Advisory Commission his summons to labor. With great emotion he told of coming to this country as a child, of his experience in the sweatshops — for which, as he said, “I have never quite forgiven society” — and of his overpowering desire that American labor should instantly come to the side of the Government in the event of war. He said particularly that he did not want the United States to have the same difficulty with labor that England had in her first year and a half.

Gompers sat at one end of the Commission's long table, Chairman Willard at the other, with Baruch, Rosenwald, Coffin, Martin, Godfrey, Gifford, and the writer along the sides, all listening intently. The writer took many of Mr. Gompers's remarks verbatim. There can be no doubt that in this contingency the veteran labor leader was first an American and a special pleader for the working-men afterward.

Pursuant to Mr. Gompers's call, more than one hundred and fifty persons representative of labor organizations and of finance, commerce, and industry, as well as public and civic interests, met in Washington on April 2, 1917, as members of his general committee. Other members were added to the general committee thus created, until it eventually numbered several hundred persons. An executive committee was appointed with the following membership:

Samuel Gompers (Chairman), American Federation of Labor, Washington, D. C.

William B. Wilson, Secretary of the Department of Labor, Washington, D. C.

V. Everit Macy, President, National Civic Federation, New York.

James Lord, President, Mining Department, American Federation of Labor, Washington, D. C.

Elisha Lee, General Manager, Pennsylvania Railroad Company, Philadelphia, Pa.

Warren S. Stone, Grand Chief, Brotherhood of Locomotive Engineers, Cleveland, Ohio.

C. E. Michael, National Association of Manufacturers (President, Virginia Bridge & Iron Company), Roanoke, Va.

Frank Morrison, Secretary, American Federation of Labor, Washington, D. C.

Lee K. Frankel, Third Vice-President, Metropolitan Life Insurance Company, New York.

James O'Connell, President, Metal Trades Department, American Federation of Labor, Washington, D. C.

Louis B. Schram, Chairman, Labor Committee, United States Brewers' Association, Brooklyn, N. Y.

Ralph M. Easley, assistant to Samuel Gompers, New York.

James W. Sullivan, assistant to Samuel Gompers as member of Advisory Commission, Brooklyn, N. Y.

Gertrude Beeks, Secretary, Executive Committee, New York.

Other committees and their chairmen were:

Wages and Hours, Frank Morrison, Chairman, Washington, D. C.
Mediation and Conciliation, V. Everit Macy, Chairman, New York.

Welfare Work, Louis A. Coolidge, Chairman, Boston, Mass.

Women in Industry, Mrs. Borden Harriman, Chairman, Washington, D. C.

Information and Statistics, Dr. Frederick L. Hoffman, Newark, N. J.

Press, Grant Hamilton, Washington, D. C.

Cost of Living, Domestic Economy, S. Thruston Ballard, Louisville, Ky.

The executive committee adopted a resolution regarding the attitude of Governments, State and National, toward labor during the period of the war, which was approved on April 7th by the Council of National Defense and the Advisory Commission. The most significant paragraph read:

That the Council of National Defense should issue a statement to employers and employees in our industrial plants and transportation systems advising that neither employers nor employees shall endeavor to take advantage of the country's necessities to change existing standards. When economic or other emergencies arise, requiring changes of standards, the same should be made only after such proposed changes have been investigated and approved by the Council of National Defense.

This statement subjected the Council to some criticism, as advocating a policy which was opposed to the maximum of effort on the part of labor that the strain of war would involve. The Council issued an interpretative statement, the gist of which was that the Council felt that it was incumbent upon it to warn both employers and employees that the public necessity of a state of war should not be used by either group as a means of attaining ends that had not been realized in peace. In effect, the Council's position was that during the war there should be a truce between conflicting industrial interests, for the period of which each side should hold the ground it held at the beginning of hostilities, subject only to such alterations as should be made for promoting industrial efficiency and that the determinations of such alterations should not be left to arbitrary action by either side.

No effort will be made here to follow further the work

of the Committee on Labor and its various sub-committees and sections, which contributed greatly to the organization and policies of the War Labor Administration of the Department of Labor. At the beginning of the war about the only machinery that department had that was suitable for dealing with the emergency in any way were the United States Board of Mediation and Conciliation, created to deal with disputes in the railway service; the Division of Conciliation, which aimed to compose labor disputes, by acting in an advisory capacity; and the United States Employment Service. These three agencies were not, however, organized, authorized, and equipped in such a way as effectively to meet the many and pressing labor problems that war evoked.

As in dealing with most of the novel situations created by the war, comprehensive handling of the labor factor evolved but slowly. The first acute emergency was created by the menacing revolutionary activities of the Industrial Workers of the World in the mining and lumbering industries of the mountain States and the Pacific coast. The President appointed a commission, which was known as the President's Mediation Commission, with William B. Wilson, Secretary of Labor, as chairman, for the purpose of dealing with the concrete questions raised by these activities and of studying the conditions which bred them. This commission dealt successfully with a number of disputes, discussed the causes of labor unrest, and recommended, among other things, that the Nation should recognize the principle of collective bargaining, the creation of "continuous administrative machinery for the orderly disposition of industrial issues," and of "a unified labor administration for the period of the war." This report was not made until January 9, 1918.

In the meantime the army, the navy, the Shipping Board, the Fuel Administration, and the Railroad Administration were each dealing with the labor question in piecemeal fashion. They were adjusting their own labor questions more or less independently and were competing with each other in the labor market. The labor turnover had become enormous as men lured by higher wages flitted from job to job. The demand was increased by the war boom, and at the same time the supply was curtailed through the dimin-

ishing of immigration and the calling of millions of men to the colors. The unscrupulous activities of private employment agencies became a national scandal. Strikes were fomented to create opportunities for their profitable employment. They raided well-manned industries to get men for others, and employers often maintained employment bureaus which brazenly "stole" labor right and left. Wages were so unsettled, so ascendant, so various; employment conditions were so diverse, competition between employers so keen, that labor began to lose its balance. Strikes over the most trivial matters became frequent and the consequent loss of productive effort was enormous. The word "chaos" is the only one that fits the general labor situation that prevailed in the first year of the war.

The Council of National Defense, quick to safeguard labor as it was, wrestled with the question of labor administration for months, but while its Advisory Commission's Labor Committee had done much within its province the Council itself held back, and all of many attempts to get it to take the initiative in establishing some sort of central control of labor failed, until January 3, 1918, when Secretary Lane introduced a resolution asking the President to approve of the appointment by the Council of a War Labor Board. Even then the Council declined to take positive action, but ordered that the Lane resolution and an account of the discussion on it be transmitted to the President. This resolution provided that a Board composed of the Secretary of Labor, a representative of employers and a representative of labor shall be authorized to negotiate an agreement between the manufacturing industries of the United States and labor employed therein, to endure as modified from time to time by the said Board, for the period of the war; this agreement to include the creation of machinery by which the stoppage of production by strikes or lockouts will be prevented, and the establishment of adjustment boards for the settlement of industrial disputes.

The Lane resolution further provided that the Department of Labor should set up a comprehensive war labor administration for the execution of the following functions:

1. A means of furnishing an adequate and stable supply of labor to war industries. This will include:

- (a) A satisfactory system of labor exchanges.
 - (b) A satisfactory method and administration of training of workers.
 - (c) An agency for determining priorities of labor demand.
 - (d) Agencies for dilution of skilled labor as and when needed.
2. Machinery which will provide for the immediate and equitable adjustment of disputes in accordance with principles to be agreed upon between labor and capital and without stoppage of work. Such machinery would deal with demands concerning wages, hours, shop conditions, etc.
 3. Machinery for safeguarding conditions of labor in the production of war essentials. This to include industrial hygiene, safety, women and child labor, etc.
 4. Machinery for safeguarding conditions of living, including housing, transportation, etc.
 5. Fact-gathering body to assemble and present data collected through various existing governmental agencies or by independent research, to furnish the information necessary for effective executive action.
 6. Information and education division, which has the functions of developing sound public sentiment, securing an exchange of information between departments of labor administration, and promotion in industrial plants of local machinery helpful in carrying out the national labor programme.

The outcome of the Lane resolution and the report of the President's Mediation Commission was the designation by the President of Secretary Wilson as War Labor Administrator. The latter appointed Dr. Felix Frankfurter, who had been assistant to the Secretary of War and was secretary and counsel to the President's Mediation Commission, as his assistant in charge of war labor matters. At the same time Secretary Wilson appointed an advisory council, headed by former Governor John Lind, of Minnesota, to consider and recommend such changes in the Department of Labor as were necessary to fit it for its emergency duties as a war labor administration. On what might be called the judicial as distinguished from the strictly administrative side of the labor problem, the Secretary appointed an advisory body, the War Labor Conference Board, which laid down certain principles of relations between employers and employees in the war industries and recommended the establishment of a

National War Labor Board to apply these principles in the adjudication of disputes arising out of such relations.

This body consisted of five representatives of employers chosen by the National Industrial Conference Board, and five representatives of labor designated by the American Federation of Labor. Each of these groups then selected a representative of the general public; the labor men naming Frank P. Walsh, and the employers former President William H. Taft.

Among the principles established for the guidance of the War Labor Board were the right of both employers and employees to organize in associations of groups and to bargain collectively; that workers should not be discharged for membership or legitimate activity in trades unions; that non-union workers should not be interfered with; and that all workers were entitled to a minimum wage "which will insure the subsistence of the worker and his family in health and reasonable comfort."

The War Labor Board, composed equally of representatives of labor and employers, had as its joint chairmen former President William H. Taft and Frank P. Walsh, former chairman of the Industrial Relations Commission. It was appointed by the President in April, 1918, and came to be known as the Taft-Walsh Board. It endeavored to settle industrial controversies in the first instance through informal action by sections and local committees. These failing, the Board itself sought definitely to compose disputes by acting as an arbitration commission whose decisions were unanimous. Lacking such a decision, a dispute was finally dealt with by an umpire selected from a panel of ten, appointed by the President. In this way some hundreds of serious disputes were amicably settled.

It is noteworthy that the War Labor Board had no statutory authority and that its decisions were not legally binding. But, as they represented the will of the President and of the vast executive and administrative establishment that was carrying on the war, and were supported by a public opinion that would permit no foolishness, they were always observed. Attention is called to the analogy of the judicial side of the War Labor Administration to the Executive control of indus-

try under the War Industries Board. Both functioned by consent of the governed rather than by intrinsic powers.

While the War Labor Board was of the greatest assistance to the War Industries Board in composing and adjudicating the disputes which interfered so much with production, the latter was in a way more interested in the War Labor Policies Board, for the latter, which was created in May, 1918, about the time the reorganized War Industries Board began to get into its stride, proposed to standardize the practices of the Government as an employer of labor, whether directly or indirectly; and to establish a central control for all industries of questions relating to the distribution of labor, wages, hours, and working conditions.

The Policies Board applied the execution of its policies directly to all industries having contractual relations with the Government. Others were reached through the War Industries Board by means of its control of materials, transportation, and power. No transfer of labor from one industry to another was to be sanctioned unless directed by the War Industries Board, and it was hoped to remove the incentive for individual change of employment by standardizing working conditions and wages. The War Industries Board was represented on the War Labor Policies Board by Mr. Frayne. The other members were Felix Frankfurter, chairman; Stanley King, representing the Secretary of War; Franklin D. Roosevelt, the Navy Department; G. I. Christie, the Department of Agriculture; John P. White, the Fuel Administration; R. P. Bass, the Shipping Board; Howard Coonley or Charles A. Piez, the Shipping Board and the Emergency Fleet Corporation; and representatives of the Food and Railroad Administrations.

Although the War Labor Board had its general policies and principles determined for it by the President and by the National Industrial Conference Board, no conflict with it was involved in the creation of the Policies Board. The latter adopted the general principles of the former and then sought to apply them at the source of labor troubles by securing the general adoption of concrete practices that were in harmony with them. In other words, it sought so to harmonize employers and employees in their relations that disputes would be

avoided, and so to standardize wages that they would be taken out of the realm of disputation (analogous to price-fixing of commodities).

Working conditions were also to be standardized, not only as between different employment agencies of the Government, as in the shipyards, the navy yards, and the arsenals; but between them and private industries working on Government orders. It was possible for the Government as employer or paymaster to force its will in those fields. There remained the problem of competition of non-war industries, which were brought into line by the power of the War Industries Board over all the other factors of production.

The war came to its end before the Policies Board's programme had been applied, or even worked out, in full, but it seems probable that the basis of satisfactory control of labor on the human side had been reached through the two boards and the Division of Labor of the War Industries Board. While these agencies were making progress in their fields of policy, mediation and adjudication, the executive administration of labor as a commodity to be collected, trained, allocated, distributed, cared for, and conserved was being dealt with by new, reorganized, or enlarged administrative agencies within the Department of Labor.

The most important of these agencies was the reorganized United States Employment Service, which acted as a national labor employment medium, and aimed at controlling the whole supply of labor; one purpose being to give the War Industries Board the means of applying the principle of priority to labor, just as it was applied to materials, etc. The first step in this direction was an appeal to all employers to refrain after August 1, 1918, from recruiting unskilled labor in any other way than through the Employment Service.

Surveys were made of the common labor requirements of the war industries and of the reserves of such labor in each State. Employers were forbidden to make any effort to recruit labor (but might continue to hire such as applied at the gates of plants) without a special permit from the Federal Director of Labor for the particular State, or a permit from the Director-General of the Employment Service for the recruiting of labor outside the State. It was further provided

that no unskilled labor should be transported from one State to another without special permission. In distributing such surplus labor as was found to be available, the system of the Priorities Division of the War Industries Board was utilized.

While the Employment Management Section was not in the Labor Division, it was directly related to labor problems. Inefficiency of production during the war was partly due to defective management of employment. Hire-and-fire was the cut-and-dried way in which most labor forces were built up, which naturally resulted in a vast amount of misfit employment and a very large labor turnover. The idea of training employment managers for the war industries probably originated with Morris L. Cooke, chairman of the old Storage Committee of the Council of National Defense — a committee which had no heir in the Board sections. It was cordially received by the industrial service sections of the Ordnance Department, the Quartermaster Corps, and the Emergency Fleet Corporation. Captain Boyd Fisher, of the Ordnance, took the active management of the work of providing training courses for employment managers, assisted by a joint committee from the above agencies and the navy. When the War Industries Board succeeded the Council organization in all industrial matters, an employment management section was set up with James A. Inglis as chief. Training courses were established with excellent results at the Universities of Rochester, Harvard, Columbia, Pittsburgh, Washington, and California.

In the iconoclastic days of war, when conventions were ignored and traditions forgotten, when the test of men and machines was their qualification for promoting victory, the belief was common that, with the shackles of the past thrown off, permanent revolutionary changes in industry and society would follow. The recommendations of the President's Mediation Commission and the principles laid down for the guidance of the War Labor Board were hailed as new and epoch-making charters of the rights of labor. Supported, as they were, by hundreds of quasi-judicial decisions by the Board and their resulting application in practice, it was thought that they would inevitably continue to be observed and become the conventions and traditions of a new era in

the relations of employers and employees. In particular it was thought that the principles of the minimum wage, recognition of trade organizations, and collective bargaining would be so firmly anchored during the war that the backwash of peace could not dislodge them.

Four years after the armistice it is plain that these hopes are not to be realized in full. Labor, it must be admitted, did not rise to the level of its opportunities. Feeling too fully its power, it slowed up after the war to such an extent that for a long time it was not more than sixty per cent efficient. Employers felt that labor had taken advantage of the necessities of war to exact from them concessions that were unendurable, and they determined to even up the score when circumstances should be favorable.

Such circumstances arose when the inevitable industrial depression set in. But even before that the programme of the radical laborites, who were not content with the advances made during the war, but boldly sought to syndicalize industry, was crushingly defeated in the great steel strike of the fall of 1919, which was also a blow to conservative labor programmes. The failure of this strike was the death-blow of bolshevism in America, and stimulated chauvinism among employers.

Since then there has been a powerful campaign for the open shop, and virtually for the destruction of the power of labor organizations. The aggressiveness of employers, combined with the pressure of unemployment in 1920-21, resulted for the time in an apparent loss of most of the advantages gained by labor during the war. These losses, however, were rather the losses of labor in respect of the power and influence of its organizations. There has been a real gain in the national understanding of the labor problem and in a changed attitude of employers who, regardless of their attitude toward labor organizations, are everywhere intent upon improving the status of labor for reasons of self-interest if for no higher motives.

As labor as a commodity began to reach the stage of a known and controllable factor, the War Industries Board established in the fall of 1918 a Labor Priorities Section with A. W. Clapp as chief. The first labor priorities order was

issued September 17, 1918. It explained to members of the United States Employment Service that the preference list of industries did not include all essential industries, its chief purpose being to procure an automatic flow of fuel and transportation service to such industries, and that in some instances labor would require separate treatment. Lumber, for example, was not on the preference list because it was intended to discourage long hauls of that commodity for the use of civilians and to promote the use of wood as fuel. But as certain kinds of lumber were in great demand for war purposes, it was important that the labor supply should be husbanded.

The establishment of priority control of labor led to a great expansion of the power of the War Industries Board. As it was necessary that the additional men called to the colors under the selective draft should be chosen with scrupulous regard for the interests of the most essential industries, it became necessary for the Provost Marshal to widen the scope of his "work or fight" regulations. He appealed to the Board to help him to apply them to larger numbers of men and in more industries than at first. It now became the duty of the Priorities Division to specify what industries were freely open to the draft and what must be safeguarded. After conference with General Crowder's office and the American Federation of Labor, a bulletin was prepared which abolished the labor exemption privileges of whole classes, such as private chauffeurs, traveling salesmen, etc.

Thus the War Industries Board, already supreme in materials, facilities, finance, and transportation, wheresoever involved in the industrial prosecution of the war, now became the allocator of men, not only between industries, but between civil and military life. It was become the virtual general staff of the civil life of the country as applied to war ends. All America in all its material and human resources was subject to its command. It was an industrial dictatorship without parallel — a dictatorship by force of necessity and common consent which step by step at last encompassed the Nation and united it into a coördinated and mobile whole, supporting the army and navy with all the incomparable strength of the greatest industrial potentiality in the world.

CHAPTER XVI

IN THE SEAT OF POWER

Pacifism and the dollar expended — Industry in a blind alley — The transformation — A one-man authority arises — Should it have been expanded further? — The Board's hard road to power.

THE preceding chapters of this book and the first fifteen months of America's participation in the war represent in large measure the doing of what should have been done long before the war; namely, the ascertaining of what was to be done and how to do it. In the school of experience and at a tremendous cost the objectives were at last clarified, the methods established, and the mechanism outlined and largely filled in. Once again we had paid a staggering price for that ineradicable folly of the blind pacifism of America, which is forever sure that each war will be the last.

Some one has calculated that ninety-three cents out of every dollar of current Federal expenditures represents the costs of war and armaments past and present. That calculation is based on a perversion of facts. It would be very much nearer the truth to say that seventy-five cents of every dollar of current expenditures is the cost of blind pacifism. It is not improbable that a billion dollars of extraordinary expenditure on preparedness between 1914 and 1917 would have saved ten billion of the twenty-four billion dollars the war cost us, exclusive of loans to the Allies. It is even possible that such an outlay would have made our actual participation in the war unnecessary. Germany dared our intervention because she believed the Allies would be finished off before it could become effective. The event showed that her calculation was not far wrong.

As early as May, 1917, it was perceived in the councils of those who were striving to introduce order into the direction of industry for war purposes that there must be some central head of industrial direction and that the determination of priority of every need or requirement must be the

keystone of its functions. A year was to pass before the full power of determination of priority, supported by central control of the power of commandeering, was finally centralized in the War Industries Board. Progress was being made during that period, but, as a general statement, it is safe to say that during that time American industry was working furiously, but blindly, for the furtherance of war ends.

Clearance of current orders was the first step toward the introduction of priority. Then followed the study of requirements and resources with the resulting application of the principle of priority to the future. Finally, we have the Priorities Division of the War Industries Board, with a Priorities Board that takes all the information in hand, balances requirements against resources, determines the superior need, and directs the indicated action. Price-fixing evolves at the same time, and finally there is a powerful Price-Fixing Committee. Conservation of men and materials, allied to prosperity, explores its way, and at last becomes a powerful and effective machine. The control of facilities and the conversion of industries to war uses become comprehensive and systematic. In the exercise of priority and its concomitants and of price-fixing, the War Industries Board gradually interlocks with all of the war-making agencies of the Government — with the Shipping Board, with the Treasury Department, with the army, with the navy, with the purchasing commissions of the Allies, and with the economic controls of the Allies, with the war administration of labor, with the Railroad Administration, with the Food and Fuel Administrations, and others.

There results from the peculiarity of this interlocking that a Board which was originally only one among equals becomes at length paramount. The interlocking boards and committees are made up of representatives of many or all of the war agencies, but they are committees of the War Industries Board, and the chairman of each is either a member of the Board or of its organization. Behind all the functional boards and committees, except the Price-Fixing Committee, stands the chairman of the War Industries Board, in whom the final power of decision rests. Thus, once one of these apparently inter-departmental committees

takes up a subject, it opens the way for the channel of power over it to the chairman of the Board.

Even the Price-Fixing Committee is within his influence. It is true that he does not make prices, but he is a member of the committee and the committee knows that its business is to establish prices conformable to the general policies of the Board.

Thus, the War Industries Board, in its general function of coördinating industry to meet the demands of war, gradually arrives at the position wherein it exercises control over all the other agencies in matters that fall within the scope of its function. At last, behind that gradually evolved commanding position the President lodges the enormous power of the veto of the commandeering privilege, which implies its exercise, and supplements it with full control of a number of the principal commodities and their industries.

Toward the other war-making bodies the War Industries Board now comes to hold a relation analogous to that of the Federal Government to the States and their people. The Board does not attempt to control or dominate the other bodies in their peculiar fields, but it affects their activities by the application of its general policies to the factors of production. The Government at Washington does not attempt to tell the Government at Sacramento what it shall do in California, but in many ways it acts directly and authoritatively on the people of California. So the War Industries Board did not undertake to tell the army what to do in the military field, but it was able to tell war industries what to do with respect to army orders.

To a foreigner our duplex system of government, whereby the individual is at once subject to the National and State Governments and has a dual allegiance, seems complex and clumsy, but it works admirably. To a detached observer the finally evolved system of Government relations with industry during the war would likewise seem complex and clumsy. Every producer was subject to some agency of the Government which had the buying power; on the other hand, he was subject to the War Industries Board, which had no buying powers. Again, just as the sovereign States, as well as the people, are represented in the Government at Wash-

ington, so the various war-making agencies, charged with particular divisions of the task, were represented in the War Industries Board, and in a way composed it.

All of this interlocking and federating would have been merely an aggregation of debating societies had it not been for the fact that the moment they began to counsel they created responsible power, automatically lodged in the last analysis in the chairman of the War Industries Board. The Shipping Board, for instance, might have been very loath to see the War Industries Board applying its function of priority in a certain field. But to oppose a policy of the War Industries Board it had to speak through its representatives on the Priorities Board. Then and there the chairman of the former became the final arbiter of the question at issue. It is an admitted fact that this loose and seemingly frail machine of interlocking committees, emanating from a body that held no purse-strings and was empowered only in indirect ways, exercised a firmer and more general control over industry than did the munition ministries of France and England.

Whether it would have been better if the body that finally firmly gripped the sequences and processes of industry for the emergency of the war by federating and blending them with itself had also held the purse-strings is not to be decided easily. In that case it might have lost itself in a multitude of matters with which it was not conversant and have sacrificed intelligent general control and sound counsels to absorption in detail. As it was, it escaped the infinite burdens of negotiating and drawing thousands of contracts and the multitudinous details of purchase, procurement, inspection, transportation, and finance. It remained a small and compact body, creative, advisory, and generally directive, rather than executive; free to take the broad view and make the unbiased decision. It is probable that, without sacrifice of its efficiency and with great benefits to the Government and the country, it could have extended its control of the business side of war further into the sources.

It had to deal with many problems which would never have arisen if it had exercised authority at the source. For example, it might have been well for the War Industries

Board to have had the power to decide such a question as whether we should attempt to manufacture 75's in this country or get them all in France. Such questions as this, the Board always considered military and, therefore, outside its province. It conceived its duty to be the fulfilling, not the determination, of the requirements of the army and navy. It would not tell the army how many or what sort of guns it should have manufactured; but, when the army had decided, the general problem of getting production fell to the Board.

No doubt, the proper functions of the Board were thus gummed up at the beginning. However it might have been had the Board started full-fledged at the beginning of the war and with a clean slate, it had to adapt itself to the facts of the time of its rise to power. It sought to discharge its functions through existing machinery and agencies, creating only such additional machinery of its own as was necessary to unite and coördinate what was already set up and deeply involved in war work.

So far we have treated of the origin and growth of the functions of the Board and the general administrative organization they entailed. These were lodged in the Board proper and in certain subsidiary organizations which have been described, with one exception. These functional divisions of the Board were those of Priority, Price-Fixing, Labor, Technical and Consulting, Requirements, Purchasing Commissions for the Allies, Conservation Division, Facilities Division, Resources and Conversion Section, Conservation Division, and the Division of Planning and Statistics. All of these and their subsidiaries dealt with the general policies involved in their functions and were more or less executive and advisory. The Technical and Consulting Section was a functional part of the Board on which it was represented through Mr. L. L. Summers, who was styled Technical Adviser, but it seems better to describe it in conjunction with the subjective chemical and explosives divisions, which were under Mr. Summers's direction.

It was a long and hard period of slow growth before the War Industries Board was at last full grown and in full command of its developed functions of interknitting and

synchronizing the manifold activities of the huge war machine that America had built with haste and waste. But it was a sturdy if delayed growth. While it had been sending down its roots, shooting out branches and raising its head above the tangle of war agencies, it had been developing and toughening internally. The commodity sections — the trunk of the tree — had become specialized, defined, ordered, and manned by the best types of American industrial talent, genius, and experience.

It would be an exaggeration to give the impression that the War Industries Board approximated perfection of function as soon as it came into fullness and power. The tangled growth of luxuriant disorder was not to be cleared in a day, and it was a matter of time to reveal and prove to all concerned that there was at last a single expert and powerful hand at the helm. Dependent for a full measure of success on the whole-hearted coöperation of many governmental agencies, thousands of executives, and the masterful and often headstrong captains of industry who must be gently gathered in and restrained; opposed to the last in some quarters, the Board had to make haste slowly. Nor would it be accurate to say that the Board made no errors. To say that would be to say that it did not act — and action, quick and vigorous, was one of its outstanding characteristics.

CHAPTER XVII

THE BACKBONE OF THE BOARD: THE COMMODITY SECTIONS

Baruch taps three hundred and fifty industries—Administrative organization at its height—The mechanism visualized—The Board's genesis—The discarded committee plan—Dissecting the commodity sections—The appetite for facts—A head center for producer and consumer—Guesswork annihilated—Industry mobilized, drilled, and militant—Coördinated industry at the service of coördinated consumption—The philosophy of business in Government—Dreams of an ordered economic world.

THE commodity sections were the source and the life of the War Industries Board. The Board grew out of and with them. All the other administrative divisions were based on them. They were the substance of the stuff of which requirements, price-fixing, priority, and all the subsidiaries of those three were made. They were American industry in microcosmic reduction.

Mr. Baruch used to visualize them as sixty-odd neatly labeled taps, from which he and the various boards, committees, and divisions that functioned between the sections on the one hand and the governmental departments, the Allies, the public and the industries on the other hand, could draw all the facts, figures, ideas, and contrivances for any situation. They tapped some three hundred and fifty industrial reservoirs, represented ultimately by the war service committees of the Chamber of Commerce of the United States.¹

These taps were duplex and reversible. Turned one way, they poured into the Board the controlling information in regard to all American industry that was not controlled by those two independent commodity bodies, the Fuel Administration and the Food Administration. Turned the other way, they promptly transmitted to all industry the behests and requests of the Board.

Altogether the commodity sections represented the highest type of administrative organization the United States has ever seen. It was a vast order without a single taint of bureaucracy. It was abundant knowledge with no trace of

¹See Appendix for personnel of committees.

pedantry. It was keen and expert business in government with absolute disinterest. It was the sort of government that would be ideal in peace if it were possible to maintain in ordinary times the output of energy, the singleness of devoted purpose, and the high ideals that dominate men in numbers only in times of imminent national peril. Modern government is more economic than political, but the management of government remains not only political, but also partisan.

The commodity sections were business operating Government business for the common good. They reduced the deadliness of routine to the lowest possible minimum. They operated, not by the ponderous momentum of custom, but by the alert *élan* of an initiative which faced each succeeding problem with zest and curiosity. They had to the highest degree that mobility, ductility, and resilience that are so constrained by the rigid lines of bureaucracy and even of most business organizations. The nominal partition that separated the field of one section from the others was highly osmotic. Overlapping and interfusion were characteristic of the organization of the War Industries Board all the way through. It was not the sort of overlapping that, for example, chokes Alaska by the formalism of thirty bureaus, but the overlapping, the interpenetration of unjealous, cordial team-work, uncurbed by the hard-and-fast lines of statutes and regulations aimed at prevention of abuse of power instead of its efficient application.

Imagine a business enterprise composed of sixty partners, each of whom is experienced in a particular field, but not lacking in knowledge of some of the other fields and of general industrial and commercial processes. Assume, further, that they are mostly men under fifty, and that none of them is stale or cynical and that they are engaged in a novel, stimulating, and absorbing enterprise, which so dominates their lives that with respect to its realization they suppress all jealousy, eliminate internal politics, and are free from self-seeking. Now, put them under a loose central control whose purpose is not to dominate, but to coördinate them, and which gives to every partner the full control of his assignment accompanied by the fullest confidence, with virtually no

limitation, and you have the commodity sections of the War Industries Board; and, practically, the Board itself.

If you surround this central group of experts, who are largely of the type that unites the vision of the engineer to the practicality of the production manager, with a responsive environment of men of similar type made up of several hundred committees representing in a very authoritative though voluntary way virtually the whole of American industry, you will have an almost ideal control of the industry of this continent. You have not only control, but you have a vital organism, moved from the center to the remotest boundaries by a high resolve.

This loose organization, close-knit only by the threads of an inspiring common purpose, achieved results with a surprising celerity. If the tap was turned in Washington, there was the same instantaneous response at the remotest contacts of the system that the automatic water-heater gives to the bathroom faucet. The war committees of industry knew, understood, and believed in the commodity chiefs. They were of the same piece. They responded not to orders, but to rationalized inevitability, in the determination of which they were potent factors. Guided and informed by what they learned from the commodity sections, they imposed on their industries by democratic consent the burdens and restrictions of industrial mobilization and largely composed and administered their own regulations and discipline.

The first stage of the commodity sections was in the committees on war goods and materials formed by the members of the Advisory Commission of the Council of National Defense, but more particularly in the sub-committees on raw materials. The Committee on Raw Materials, under Baruch, Summers, and Meyer, eventually became the War Industries Board, for two reasons: first, because after a few months it was plain that the basic economic problem of the war was lodged in the administration of the production, procurement, and allocation of raw materials; and, second, because it had grasped the true idea of control of industry, Baruch's faucet idea — the compacting of knowledge and direction of all things pertaining to a given commodity into

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the hands of practical specialists, who were to operate through the existing business mechanism instead of through an artificial, superimposed, brand-new administrative machine.

From the very beginning the raw materials sub-committees and their manipulation were differentiated from the other Advisory Commission committees that had to do with supplies. Mr. Baruch conceived of his committees as implements of the government of industry, but not as the Government. They were to control their respective industries for the Government, but they were not to control the Government. He was too worldly wise to think of giving over to any group of men the virtual determination of their own business relations with Government. For a long time he and two or three assistants discharged the function of contact from the side of Government with these committees. The committees were freely used, but they were watched.

When in the summer of 1917, in response to public criticism and Congressional action, it became necessary to draw a sharp line between the coöperative committees of industry and the direction of governmental contact with industry, the Raw Materials Division of the War Industries Board was not much affected; none at all in principle, though some in form. Mr. Baruch and a few associates could no longer cover the whole field of commodities with an eye single to the protection of the Government's interests. The old committees were disbanded. Men from them went over to the Government side of the line and divorced themselves from their industries or were replaced on the Government side with commodity specialists. Thereafter the War Industries Board approached each industry through a commodity section that was entirely of and for the Board and the Government, and it was met on the part of the appropriate industry by a committee that was frankly of and for the industry, though assumedly and generally in fact dominated by the spirit of public service.

Under the auspices of the Chamber of Commerce of the United States, these committees were thereafter wholly appointed by their respective industrial groups, and were known as the "War Service Committees of Industry."

There was no longer a twilight zone of divided fealty in any man or committee.¹

Business men wholly consecrated to Government service, but full of understanding of the problems of industry, now faced business men wholly representative of industry as distinct from Government, but sympathetic with the purpose of Government. Coöperative but sharply separated points of contact were thus created. The Raw Materials Division had always maintained the separation, but in the early days the contact on its side was single or only slightly disturbed. Later in the War Industries Board there were sixty separate wires reaching out from the chairman to contact with more than three hundred and fifty industries.

This sounds dismaying, but it was really simplicity itself. Each of the sixty wires was executively controlled by a section chief. The chairman of the Board could, in human limitations, know but little of what each chief was doing. The latter's job was defined for him and he mastered it or it

¹The passing of the old trade committees was definitely marked when, on October 31, 1917, the War Industries Board directed Judge Lovett to write the Director of the Council of National Defense as follows:

"I am directed by the War Industries Board to say, in reply to your letter of the 17th inst., that the War Industries Board are of the opinion that committees composed wholly or largely of manufacturers or producers of commodities or articles, the price and production of which are not ordinarily fixed by law, such as coal, steel, copper, etc., should not be created and supported as committees of the Council of National Defense or of the War Industries Board, and thus be given an apparent legal status with respect to functions which as exemplified by the committees heretofore appointed are at least vague. Such committees, according to our information, have rendered most valuable service to the Government in the present emergency, but we do not deem them absolutely necessary. We believe that committees or other representatives created by and representative of the several trades themselves will be substantially as effective in coöperating with the Government as these committees, where there is a *bona fide* desire to coöperate. In any event, such advantages, if any, as may arise from the creation and activities of such committees as agencies of the Council of National Defense are in our judgment offset by the public prejudice against having a group of individuals, representing an industry, act for the Government in buying the product of such industry, and by the doubt as to whether the creation of such agencies harmonizes with public policy as established by statutes enacted by practically all the States as well as by Congress, designed to discourage organizations of groups of competitors in trade."

Judge Lovett's letter further made it plain that the War Industries Board would not sponsor any particular source of appointment of these committees of industry, whether by the Chamber of Commerce of the United States or by the industries directly. The Chamber of Commerce rendered an important service in this connection by seeing to it that, wherever an industry had not appointed an authorized committee, it did so; and in impressing upon all such committees the high importance of their coöperative function.

mastered him. There was no scolding, no rebuking. If the chief succeeded, he stayed; if he failed, he went. He had at his command all the powers of the Board — priority, allocation, curtailment, price-fixing, commandeering. It was assumed that he knew enough of the industries using his commodity to perceive how to wield his powers discreetly and effectually.

The establishment of the war service committees marked the end of the campaign the Chamber of Commerce of the United States had been carrying on for the creation of a Government purchasing commission by act of Congress to supersede the War Industries Board. It had been largely impelled to that campaign by the dissatisfaction of many industries with the old committee system of the Council which had the basic defect of serving two more or less opposed masters.

Not only did the different commodity sections work together happily and harmoniously, so that their strength was the strength of all; but they were fused with the general administrative divisions of the Board. Some heads of commodity sections or groups of sections had their places on the Priorities Committee, the Priorities Board, the Clearance Committee, the Price-Fixing Committee. Even if they did not belong to committees or boards, they were the chief sources of information and action of all of them. They constantly appeared as active agents at meetings of these and other bodies. In fact there was the union, not only of formal representation and informal attendance at meetings, but the union of daily routine and contact whereby virtually everything the Board did originated with or was referred to the commodity sections. Separately they were the performing members of the Board; collectively they were the Board, even though that designation was limited to an executive group of seven. Three members of the Board — Replogle, Peek, and Summers — in fact represented the commodity sections. Legge, besides his duties as vice-chairman of the Board and director of Requirements, represented commodity sections, including the small group that was still classed as the Raw Materials Division after many individual raw material sections had been established.

Altogether there were sixty-six units of the Board that were commonly referred to as commodity sections. Six of these were really functional rather than commodity bodies. For purposes of centralization and coördination, every true commodity section came under the department of some member of the Board or reported directly to the chairman. In some instances they were grouped first into divisions, as, for example, the Textile, Chemical, and Explosives Divisions, which would be in the department of some Board member. Two of the functional divisions — Conservation and Planning and Statistics — reported directly to the chairman. The Steel Division and that of Planning and Statistics had sections, but were usually dealt with as units, though in computing the number of true commodity sections as sixty, the steel sections of a commodity nature have been counted. Adding the five sections of the Division of Planning and Statistics and other miscellaneous sections of an internal administrative or functional nature that were not classed as commodity sections even loosely, the total number of primary units of the Board was somewhat more than seventy.

The commodity sections were being added to continuously, as industry after industry became subject to control. After the final reorganization of the Board under Mr. Baruch, he called and ordinarily presided at weekly meetings of the chiefs of commodity sections, which were also attended by the heads of divisions, whether members of the Board proper or not. These meetings afforded an opportunity for acquaintance, exchange of views, consideration of topics of common interest, criticism, and suggestion. They made a sort of popular assembly of the Board organization, though they had no control of policies and took action only on projects intended to promote team-work.

The actual composition of this assembly was thirteen division heads and sixty-one section chiefs, no sections or other subdivisions of the Labor, Steel, Conservation, Planning and Statistics Divisions being included, but being represented by their respective division chiefs. Of the section chiefs fifty-five headed true commodity sections. Full reports of these meetings were distributed to members. In order to keep the whole organization fully informed of

the Board's activities, there was published a confidential weekly review, which was preceded by a review with a less comprehensive field published by the Priorities Division. The latter was resumed about the time of the armistice and appeared only once or twice.¹

¹The following is a list of divisions and commodity sections represented at these meetings:

DIVISIONS

Price-Fixing Committee.	Facilities.
Purchasing Commission for Allies.	Priorities.
Explosives.	Finished Products.
Labor.	Steel.
Planning and Statistics.	Textile.
Requirements.	Conservation.
Chemical.	

SECTIONS

Tin.	Coal-Gas Products.
Crane.	Brass — Non-ferrous Tubing.
Acid and Heavy Chemicals.	*Resources and Conversion.
*Legal.	Agricultural Implements, etc.
Forgings, Guns, etc.	Foreign Wool Section.
Alkali and Chlorine.	Woolens.
Refractories.	Domestic Wool.
Optical Glass and Instruments.	*Inland Traffic.
Electric Wire and Cable.	Electrical and Power Equipment.
Platinum.	Fine Chemicals.
Wood Chemicals.	Ferro-Alloys.
Knit Goods.	Hardware and Hand Tool.
Creosote.	Chain.
Power.	Dye — Artificial and Vegetable.
Pulp and Paper.	Medical.
Electrodes and Abrasives.	Silk.
Rubber.	Flax Products.
Lumber.	Emergency Construction.
Tobacco.	Hide, Leather and Leather Goods.
Railroad Equipment and Supply.	Felt.
Miscellaneous Commodities.	Chemical Glass — Stoneware.
Tanning Materials.	Cotton Goods.
Automotive Products.	*Special Advisory Committee on
Jute, Hemp, and Cordage.	Plants and Munitions.
Paint and Pigment.	Stored Materials.
Building Materials.	Ethyl Alcohol.
Cotton and Cotton Linters.	Sulphur Pyrites.
Mica.	Non-ferrous Metals.
Nitrates.	Steel Products Section.
*News.	Projectile Steel, Rails, Alloy Steel,
*Fire Prevention.	and Cold-Drawn Steel Section.
Machine Tool.	Pig Iron Section.
Price.	Iron and Steel Scrap Section.
*Technical and Consulting.	

*Indicates technical non-commodity sections.



ELECTRICAL AND POWER EQUIPMENT SECTION OF THE WAR INDUSTRIES BOARD, WASHINGTON,
NOVEMBER 11, 1918

Front row, left to right: J. H. Waterman, Allis-Chalmers Manufacturing Company, Boston; George N. Peek, Deere & Co., Moline, Ill.; Bernard M. Baruch; W. Robbins, Wagner Electric Manufacturing Company, St. Louis; A. W. Shaw, A. W. Shaw & Co., Chicago; F. B. Leves, The Bryant Electric Company, Bridgeport, Conn. *Rear, left to right:* F. H. Schubert, Wheeler Condenser & Engineering Company, St. Louis; Max Greenburg, Worthington Pump & Machinery Corporation, New York; A. P. Bender, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.; L. W. Grothaus, Allis-Chalmers Manufacturing Company, Milwaukee; K. B. Emerson, New York Board of Water Supply, New York; J. O. Merwin, Burke Electric Company, Erie, Pa.; W. S. James, Crouse-Hinds Company, Syracuse, N.Y.; T. S. Knight, General Electric Company, Boston; F. S. Wilhoit, Cutler-Hammer Manufacturing Company, Milwaukee.

A commodity section consisted of a chief, who often had several assistants, and the representatives of the various purchasing agencies of the army, navy, Emergency Fleet, etc., that were interested in the particular commodity. At first the chief had the same relation to the departmental members of his section that Mr. Baruch had to other members of the Board; that is, the power of decision was with him. This was found to be a mistake, as the departmental representatives, standing for demand, and the sectional chief, standing for supply, would sometimes disagree, with the result that the decision was determined from the standpoint of supply. Afterwards the procedure required unanimity of the section for a decision; failing that an appeal lay directly to the chairman of the Board.

The singular result of this alteration was that unanimity was almost invariable. The change brought the War Industries Board and the supply agencies of the Government much closer together. Before it was made there was a strong tendency on the part of the former to send to the commodity sections men of inferior rank or little authority, and to act independently of it. When they found that they had an equal voice in determining the course of such a powerful aid as a commodity section, the departments sent men of rank and force to represent them. The army to a large extent duplicated the commodity system sections in its new Division of Purchase, Storage, and Traffic, so that it had a specialist of its own in each commodity section with which it was concerned. The departmental members of the sections, having absorbing administrative duties of their own, were not concerned with the section's administration, but only with its decisions.

The first requirement of every commodity section to qualify it to become one of the faucets of Mr. Baruch's visualization was an assemblage of all the facts about materials with which they dealt. These facts were not only those relating to sources of materials, processes of preparation and manufacture, names, locations, and capacities of plants, railway and other shipping facilities, but of possible substitutes, costs of manufacture, fairness of prices, and the personal equation of producers. Without this knowledge neither

the section nor any other agency of Government could act rationally. It was because there was in the beginning no such grouped practical knowledge of industry that many serious errors were made in letting contracts.

Usually the men at the heads of sections had a vast amount of unwritten information about the commodities they dealt with and they knew how and where to get the data required. They also knew the men of the industries and their capacities and characters. Nevertheless, the compilation of the basic facts and the maintenance of their currency were laborious tasks and consuming of time, when time was more valuable than money. The war service committees were invaluable in this work. The industries gave not only the ordinary statistical data, but revealed trade secrets, special processes, and improved methods, which, being cleared through the sections and the war service committees, enabled their competitors to improve quality or speed up production. Having made a survey of the industries with which it was concerned, the section was qualified to respond to the demands of the functional divisions, such as Requirements, Priority, and Price-Fixing. It was also qualified to act as the intermediary of the purchasing agencies. Into it flowed all pertinent information from industry and the Government. Out of it flowed instruction to Government agencies and direction to industries.

Thus at one definite place all of an industry — the producer — and all of Government — the consumer — could meet and dispose of every situation so far as the bringing together of requirements and supplies could do it. Many momentous matters were virtually settled by the sections before the War Industries Board proper even knew what was going on.

The sections, always on watch, would see a critical situation developing. They would assemble all the facts, call in all the manufacturers, or at least their war service committee, study the problem with them, work out the solution with all its involvements of allocation, priority, prices, etc., and then submit it to the proper functional division or divisions for approval and application.

Sometimes Mr. Baruch or other members of the Board

from their conning-towers would be the first to perceive the necessity of some course of action. In that case all they had to do was to turn on the faucet; the commodity sections saw that there was a flow of results. So far as it was humanly possible under the conditions, the commodity sections had their respective industries always on tap. There they were — sixty of them — packed into the temporary plaster and lath building of the Council of National Defense — focusing in Washington all the facts and all the factors of control of American industry.

As they came into efficiency, all the guesswork, uncertainty, and vagueness of Government relations with industry disappeared. Replogle could say to army, navy, Shipping Board, Allies, Industries: "Here's the steel tank. Let me know how much each of you is to have. There's exactly thirty-three million tons to go around." So with all the other controlled industries. No more did Government agencies shoot orders in the general direction of sources of goods, hoping to hit something sooner or later. The commodity sections stood at their respective tanks, their hands on the spigots, prepared to measure out the Nation's resources, not on the old principle of first come, first served, to the limit of his demand, but in neat allocations according to the standard of priority. To use another simile, the old way had been that of general admission to a theater. Everybody who wanted seats rushed into an auditorium of unknown capacity and took them, and the last comers were out of luck. The new way was by reserved seats. It is true that under this system some got no seats, but they could get along without them. Standing room or the sidewalk sufficed for them.

The more one studies the operations of the commodity sections, the more he is impressed by their simplicity and efficiency. They were more than the mobilization of industry. They were industry mobilized and drilled, responsive, keen, and fully staffed. They were industry militant and in serried ranks. The War Industries Board stood for coördination among the war-making agencies, and it practiced its own preaching at home. In the end it placed superbly coördinated industry at the service of coördinated consumption. Thanks, of course, to priority, but the commodity sections were the alpha and omega of priority.

The commodity sections triumphed because they possessed knowledge. In them, if anywhere, supply was appraised and demand measured. Through their representative composition they penetrated all war agencies and bound them indissolubly together and to the magnification of the War Industries Board. Around plain yellow desks in little hot cubicles of offices a handful of men met with the resources and disposition of mighty industries in their hands. It was only a matter of cutting the cloth to fit the suits.

At one of the weekly meetings of the commodity sections an enthusiastic section chief complained that, whereas the War Industries Board continuously and diligently invited and urged all other Government bodies concerned in the war, directly or indirectly, to be represented on its sections, committees, boards, and divisions, there was little or no reciprocity. This was a blessing in disguise. All channels of influence and power thus converged in the Board, and it did not dissipate its strength. It tapped the other bodies for the elements of its own nutrition, and grew great by serving them. This was proper and logical and overcame the tendency for each part of the Government to wage its share of the war in a water-tight compartment.

A marked characteristic of the work of the commodity sections was the slight administrative machinery they required. The burden of preparation of information and the handling of an infinite amount of the detail of administration fell largely on the industries and their committees; the latter often maintaining (at an expense prorated among the industries concerned) large staffs and well-appointed offices to look after the details of liaison between industry and the commodity sections. On the Government side, the details of plans, specifications, contracts, inspection, production, and delivery were in the hands of the different supply departments. The commodity sections were thus relieved of a vast mass of time-consuming and energy-exhausting detail. They were free to devote themselves to the outstanding problems of determining and enlarging resources, indicating maximum prices, uncovering and creating facilities, compiling and compacting requirements, speeding up industry, and informing Government in the ways of business.

The reader may, perhaps, be confused by mention of the commodity sections as dealing with the functions of priority, prices, requirements, etc. The commodity sections were not merely collectors and keepers of stores. Each was a miniature War Industries Board for its commodity. In a very large degree the functional divisions were merely offices of record and formal approval for the dealings of the sections with their functions. All of the Board's functions were rooted in the sections. The divisions were little more in some respects than orderly entrances and exits to the sections. The principle of decentralization of authority by a central head in which it was definitely lodged was carried to the highest degree.

This was the grand differentiation between the mobile War Industries Board and the rigid bureaucracy of the War Department and Government in general. Bureaucracies are machines made up of parts that are bound by statutes and regulations to automatic motions. The less play the parts have, the better the machine runs.

In a bureaucracy the perfection of the machine is the main consideration; the quality of the product a minor one. Any departure of a part from its prescribed routine upsets the whole machine. In the War Industries Board, the parts did their own work in their own way. Initiative as well as performance were in their own hands. They were adjudged, not by the smoothness of their functioning, but by the quantity and quality of their product. The head from whom authority flowed reserved only enough to keep the parts working toward a common goal. If trouble arose, appeal to the head was direct and instantaneous — no tedious ascent, step by step, to the source of authority. If failure came for any reason chargeable to human weakness or ineptitude, the man was changed, but the principle of decentralization remained inviolate. The War Industries Board was built on men, not on rules.

We may have budgets, comptrollers, departmental reorganizations, etc., to the end of time, but we shall always have bureaucracies with their woodenness of motion and their wooden-headedness of policy until Congress is willing to leave the Executive free to decentralize and big men are

willing to serve Government. The former will produce the latter.

The forms of business are dead things without the brains and initiative of business. The War Industries Board literally brought business into the business of Government. If we had a Government business manager with a free hand to run the business side of Government, as free as Baruch had in the War Industries Board, we should have a successful Government of business. The public service would be alert, initiative and energetic throughout. Some day it may occur to some President to apply the organization scheme of the War Industries Board to Government.

It is little wonder that the men who dealt with the industries of a nation, binned and labeled, replenished and drawn on at will for the purposes of war, and its train of consequences, meditated with a sort of intellectual contempt on the huge hit-and-miss confusion of peace-time industry, with its perpetual cycle of surfeit and dearth and its eternal attempt at adjustment after the event. From their meditations arose dreams of an ordered economic world. In the high tide of altruism born of the brotherhood in arms of many nations, they even talked of a possible international application of the commodity-section idea to the world's raw materials.

Brushing that aside as something a hundred years too soon, and returning to the sound footing of nationalism, they conceived of America as "commodity-sectionized" for the control of world trade. They beheld the whole trade of the world carefully computed and registered in Washington, requirements noted, American resources on call, the faucets opened or closed according to the circumstances. In a word, a national mind and will confronting international trade and keeping its own house in business order. At the very least, they hoped that some organization would be maintained at Washington that in another emergency could instantaneously expand, with the basic information ready, to deal with the problem of supply; with resources in commodity strata classifications articulating on the same level with corresponding strata of requirements.

At the beginning of the last war the confusion was partly

due to many independent requirement agencies attempting to tap the commodity strata perpendicularly at different places so that the pools of supply were exhausted without warning. A year of evolution was required to realize the Baruch idea of a single controllable outlet for each commodity. With this conception accepted for the future and the pools always filled, in the information sense, the essential commodities kept under current measure and survey, it would be a quick and easy matter to mobilize industry through a central agency amply endowed with reserve powers, but coöperatively shaped.

American industry was profoundly affected by the contacts of the commodity sections with war committees and groups of industries, which tended to substitute coöperation for competition. During the war there was virtually no competition for orders among the efficient business concerns, for the problem then was not who would get patronage, but who must accept it. Every large plant engaged in an essential industry was compelled to enlarge, work overtime, and drive in order to attain the production that was allocated to it. It was necessary for firms and corporations that had hitherto been business enemies to work together, to exchange information, to pool their resources, to lend labor and executives. Competition in price was practically done away with by Government action. Industry was for the time in what was for it a golden age of harmony. Government prices made a living possible for all except the submerged tenth of shoestring industry; and executives, relieved from the nightmare of menacing losses, were free to give their attention to quality and quantity of product.

Theoretically much of this was in violation of the letter of the anti-trust laws, and at times the Department of Justice was much perturbed. Even the industries themselves were fearful that they might be punished for doing the Government behests. On one occasion Judge Elbert Gary, chairman of the Steel Corporation, asked the opinion of the Attorney-General as to the legality of some of the inevitable consequences of united effort. Having experienced the advantages of combination for a laudable public purpose, during the war, it is not unlikely that some industrial groups have

sought since to continue it for their selfish benefits and thus have effected such an intimate flow of information between themselves, intended for study from the point of view of common action for the group prosperity, that they have been able to act as units in matters of prices and regulation of production without entering technically into agreements in restriction of trade. A complex problem of industrial regulation is thus presented. No doubt vast economies and great general benefits are derivable from close understandings and agreements between industries. But how may the public share in, instead of being oppressed by, them?

CHAPTER XVIII

STEEL: AN EPIC OF THE WORLD WAR

I. A conflict of blood and iron—The super-demand for steel—A nation's industries rock—The Board a storm center—Demand breeds demand—The attitude of the steel producers—Replogle's faith—Baruch and Gary negotiate steel for the navy—Wilson demands reasonable prices—Legge, Replogle, and Summers lay a foundation—The Board threatens to seize the steel plants—An historic meeting follows—Analysis of price elements—Production drops—Replogle repeatedly summons producers—Mastering the facts of steel—Baruch demands a show-down—The crisis is met—Details of the Steel Administration.

II. The automobile industry fights control—The Board and the industry meet—The industry denounces: Baruch, Replogle, *et al.*, reply—A stenographic report—Legge states a desperate case—The Board takes a peremptory stand—A great industry pleads for its life—The final agreement.

III. The steel industry's contribution to the war—The Federal administration of steel appraised.

I

THE World War was moved and fought on steel. In its last days it was as much a Vulcanic struggle between the Mesabi and Lorraine, between the Ruhr and Pittsburgh, as it was a final grapple of men in Flanders, Champagne, and the Argonne.

It was literally a war of blood and iron. The long, brown ore-carriers that passed in endless procession day and night through the locks of the Sault Ste. Marie were the transports of victory as much as the ocean liners that conveyed to the battle-front the fresh bodies that were to be the final offering to Mars. The thunders of war were heard no less in the booming of rollers on ingots in the valley of the Monongahela than in the reverberations of great guns in the valleys of the Meuse. The fires of war burned under the lines of coke ovens at McConnellsville no less intensely than they did in the wake of the German retreat. The men who dug the coal of coke and the ore of iron were as much combatants as the enlisted men in trenches.

The steel producers of America were as much pitted against Krupp and other German steel masters as Foch

against Ludendorff. Pig iron and steel flowing from America to Le Creusot stiffened France as much as Pershing's fighting men. Countless rolls of barbed wire from America held back the *furor Teutonicus* in 1916 and 1917, and steel rails by the thousands provided the roads of pursuit when the hordes began to recede toward the Rhine. Steel plates issued from the mills of America faster than German submarines could send them to the bottom of the ocean. Shell steel from the rolling mills of America enabled the munition plants of the Allies to provide the drum fires that smothered the German batteries, as tanks made from the same material rolled over flattened defenses.

Replogle, of the War Industries Board, as generalissimo, Judge Gary and his staff, allocating and shifting orders, changing rail mills to shell mills, structural mills to rails, and so on, were playing the war game as fundamentally as Foch baiting the German bear to exhaustion and piercing his vitals in the hour of collapse.

The industrial drama of the war is largely expressed in terms of steel. Ours is an age of steel in the arts of peace quite as much as in the arts of war. The puzzle of steel from first to last was how to meet the great new demands of war and simultaneously take care of the ordinary demands that were increased by the repercussion of war needs. For example: the greater the war traffic, largely of steel, the greater the need of the railways for steel for rails and rolling stock. The railroads cried aloud that, without repaired ways, more cars, and more locomotives, they would succumb to exhaustion. France, Italy, Belgium, and the A.E.F. demanded steel as the inescapable price of victory. The Emergency Fleet Corporation pressed for unheard-of quantities of plates of mills that were overwhelmed with orders for shell steel. Numerous colossal new war industrial plants needed to be housed in steel.

Every direct war demand bred indirect industrial demands. The fact that demand bred demand for steel was not understood in the beginning. Some authorities thought the war would require about seventeen per cent of the normal steel output of the country. President Farrell, of the Steel Corporation, after a few months got his estimate up to forty

per cent. Later he jumped it to eighty per cent. In the end the demand for steel, bred by the war, was about one hundred and twenty per cent of the possible output.

"Business-as-usual" met its first great rebuff in the steel problem. It was a smash in the solar plexus. It rocked the industries of the Nation to their base. The War Industries Board became the storm center of dramatic struggles and controversies over steel. Almost every meeting of the Board, from the first one on August 1, 1917, until the last one after the armistice, records friction between governmental agencies for steel and between them as a whole and the non-war industries; and on the part of essential industries against reduction of their supplies.

Hours and days the Board, the Fuel Administration, the Railway Administration, and the captains of the steel industry spent in trying to solve the problem of meeting an unlimited demand with a limited supply. Time and again they wrangled over and wrestled with the puzzle of how to break the vicious circle whereby insufficient coal limited coke, and not enough coke limited iron and steel, and lack of steel limited cars and locomotives and maintenance of way, and thus restricted transportation upon which coal and coke production depended. And then around the circle again.

Bound up with the circular recoil of effort upon effort was the question of prices. When we entered the war the steel industry was replete from long feeding on the unstinted patronage of the Allies, and at first the tendency was to exact as large prices from the Home Government as from the foreigners. In the records of the early negotiations between the army, navy, the Shipping Board, and the War Industries Board there are unmistakable signs of lack of coöperation on the part of representatives of industry. President Farrell, of the Steel Corporation, displayed a somewhat startling unfamiliarity with the costs of production of steel plates. Judge Elbert Gary, chairman of the board of the corporation, at first advocated excessive prices in the face of refuting figures of his own accountants. This attitude was partly accounted for by apprehension as to the instabilities of the future, by resentment at Government interference, and above all by a profound lack of understanding of the radical in-

volumements of war. In the beginning business and patriotism were confined to separate compartments.

In all fairness, it should be said that the steel men soon adapted themselves to the view that the national need was above the question of profits. As soon as they understood that the rules of the games had been revised, they observed them. When they perceived that it was not a question of how much they could get, but of how much the Government would be justified in paying, and even of how much they would be justified in asking, their attitude changed from one of wary aloofness to whole-hearted coöperation. Contrast the price of 12.15 cents a pound for steel plate, with the Japanese bidding as high as 50 cents in the spring of 1917, and the 3.25 cents later obtained.

Even at the height of this saturnalia of high prices, J. Leonard Replogle, who had been called to Washington by Mr. Baruch to advise the War Industries Board as to steel, expressed the confidence that when the situation clarified just prices could be obtained from the steel industry without resort to compulsion. In fact, on the very day he voiced this opinion he was able to put it to the test. The Italian Government was in the market for 40,000 tons of steel billets, which were then bringing around \$140 a ton in the open market. Mr. Price McKinney, of the McKinney Steel Company, of Cleveland, happened to be in Mr. Replogle's office. They discussed the general steel situation and the Italian requirement. Mr. Replogle said that it was obvious that steel could not bring such prices much longer, and asked Mr. McKinney to determine a fair price for the Italian order.

"Write the ticket yourself, Replogle," was McKinney's answer. "Any price you name, profit or no profit, will be satisfactory to me."

Replogle figured and said he guessed \$45 a ton would be about right.

That was \$3,000,000 swept away, but McKinney stood pat.

Once they got their shoulders into the collar, most of the steel men had the feeling of Mr. McKinney. They resented brusque orders, but they rarely resisted an appeal made to them on the ground of patriotic service accompanied by an

explanation. Many of them felt that they owed extraordinary service because they were making so much money. "We are all making more money out of this war than the average human being ought to," said McKinney on another occasion, in explanation of his cheerful acceptance of a hard job. Once, when Judge Gary was informing the Board that the steel interests would not ask for an increase of prices at the expiration of the ninety-day period for which prices were established, he dwelt on the fact that the level price plan accrued greatly to the profit of the Steel Corporation, "but," he added, "the tax collector comes along and takes about fifty per cent of it — and I wish it was more."

The first conflicts between the Government and the steel industry arose, however, from navy and Shipping Board contracts. The Steel Corporation stood out for 4.25 cents a pound for steel plates. Government officials had reason to believe that there was a fair margin of profit for the Corporation at 2.5 cents a pound. Informal negotiations between Mr. Baruch and Judge Gary, the former then speaking for the navy, resulted in a tentative price of 2.5 cents, subject to review. The same tentative price was later obtained by the Shipping Board. In one of the early conferences, Judge Gary offered to make a final price of 3 cents. As we shall see later, the eventual price was 3.25 cents to all producers, as compared with the 4.25 first asked by Mr. Farrell.

The tremendous instability of steel prices, the public resentment at profiteering, radical measures proposed in Congress, the actual conference of the power of commandeering on the Shipping Board, along with like powers resident in the War and Navy Departments, tended to dissolve the opposition of the steel industry to a degree of Government control of the industry. Many who at first opposed all Government interference came to welcome it. It was plain that the Government could not go along with prices unknown and variable and haggled over at every turn. There must be ordered, coöperative control on a reasonable price basis or the Government was certain to take over the whole industry. Many efforts were made to agree on some coöperative plan, but nothing but talk came out of them.

In a report to the Board on the iron and steel situation

on September 14th, Mr. Replogle dwelt on the chaotic condition of the iron and steel industry with respect to meeting war demands. It was evident that both prices and production must be coördinated with war policies. As early as July 12th the President had announced that the Government was determined on reasonable prices, and on the same day a committee from the American Iron and Steel Institute had discussed prices and requirements with the Secretary of War, the Secretary of the Navy, the chairman of the Shipping Board, and Mr. Baruch.

It was decided to leave the settlement of prices until after the Federal Trade Commission had completed the inquiry it was then making. When the report was made, it was evident that, after all, practical men would have to iron out the prices. For instance, the report gave the cost of rolling billets and blooms as varying from \$2 to \$8 a ton. Any one familiar with the process would know that the variation between different plants could be scarcely more than fifty cents. The difference was simply a difference in accounting, one mill allocating a percentage of the overhead and another not doing so. The chief value of the inquiry was that it proved that there was a great disparity in costs of production between different plants.

The bulky report, as a whole, was simply dismaying to the War Industries Board. To Judge Lovett, who, after a number of futile conferences with the steel men, had come to hold a poor opinion of their reasonableness, and had begun to despair of anything but compulsion, the report looked like more grease on the rails. It was then that Legge remarked that the bulk of the report did not mean anything at all to men who were familiar with the steel business. (The steel men, for their part, argued that the report reflected 1916 and not 1917 costs.) It was then suggested that there had been too much vague talk, and that Messrs. Legge, Replogle, and Summers make up a definite schedule of prices that should be demanded of the steel producers. Judge Lovett was due to leave Washington at one the next afternoon.

"I'll tell you what we'll do," said Legge. "If you will have a meeting of the Board at ten o'clock to-morrow morning, we will have the figures ready."

The three worked most of the night, and the next morning presented the schedule of basic coke, iron, and steel prices that was afterwards adopted for the rest of the year substantially as it stood. In fact, it remained virtually unchanged for the period of the war.

On September 18th the War Industries Board decided to call a meeting of the whole industry at Washington on September 21st to which the prices determined upon by the Board would be submitted and cordial coöperation in the war programme demanded. The temper of the Board was shown by its resolution "that, if the steel interests should not be willing to give their full coöperation because of the prices fixed, the War Industries Board would take the necessary steps to take over the steel plants."

The meeting was a stormy one. Sixty-five executives of the great industry faced the War Industries Board. There were heated arguments and even impassioned oratory. The Board's programme was definitely opposed as being too low. The smaller producers were in the difficult position that a bare cost price for them would make a good profit for the Steel Corporation and other highly integrated producers. On the other hand, the representatives of the Steel Corporation felt that they must stand by the smaller producers. On their side the members of the War Industries Board, knowing that they had purposely raised their minimum price on plates and shell steel in order to stimulate production, were not disposed to yield.

The meeting began at 10 A.M.; by noon it looked as if there could be no agreement. At this stage Hugh Frayne made a patriotic appeal in which he pointed out what a disastrous effect it would have on public opinion and morale if the leaders of the great steel industry could not amicably agree with the Government on prices, and proposed an adjournment for the purpose of "cooling off." This appeal for harmony from a labor leader made a deep impression. During the recess the steel men met and appointed committees to deal with the prices of ore, coke, and pig iron, which the War Industries Board had agreed must be priced separately as steps in determining steel prices. At the reconvened joint meeting at four o'clock the respective committees

named \$5.05 a ton at lower lake ports for non-Bessemer Mesabi Range iron ore, \$6.50 a ton for coke at the ovens (but both C. M. Schwab and Judge Gary thought \$6 enough), and that \$35 a ton for basic iron would permit ninety per cent of the blast furnaces to operate at a profit, though with coke at \$6, \$30 a ton would be fair. After Mr. Schwab, Mr. Farrell, and Mr. Clarke had made representations as to what steel should be priced at on the basis of the foregoing prices, the members of the War Industries Board retired from the meeting to permit the steel men to prepare their final schedule of basic prices.

When this was presented to the Board later in the day, it was found to allow \$5.05 for iron ore, \$6 a net ton for coke, \$33 a gross ton for pig iron, \$2.90 a hundred for steel bars, \$3 a hundred for shapes, and \$3.25 a hundred for plates. These were not far from the prices named by the Board and were acceptable to it. Upon being approved by the President on September 24th, they were confirmed in a letter from Judge Lovett, acting chairman of the Board, to Judge Gary on September 25th, which, after specifying the prices and the period of their duration as until January 1, 1918, included as part of the agreement:

Also, first, that there should be no reduction in the present rate of wages; second, that the prices above named shall be made to the public and to the nations associated with the United States in the present war with Germany, as well as to the Government of the United States; and, third, that the steel producers represented at the meeting pledge themselves to exert every effort necessary to keep up the production to the maximum of the past so long as the war lasts.

For the highly integrated producers these prices were high and meant enormous profits in the aggregate, for directly or through subsidiaries they made a profit on ore, on coke, on iron, and on steel. Yet the Board could see no practicable way to avoid allowing a profit on each step.

The cost-plus plan of prices was already distasteful to the country, inevitable as it was in some cases. The suggestion that profits be pooled and divided among all the producers had the shortcoming that it would stimulate neither the high-cost nor the low-cost producers; also it would have been

about as complicated in accounting as the cost-plus plan. It must be remembered that maximum production was then of even more importance than equitable prices. The War Industries Board sought to enlist the steel industry as an enthusiastic part of the war forces and it needed every pound of steel that could be produced. It shrank from the commandeering of the industry as a whole. Perhaps, if there should be another great war, it may be possible to draft industry just as the soldier was drafted in the last war. Industry may be compelled to labor without profit, as the soldier was compelled to fight. At best it would be a dubious experiment. Then, too, there were the excess profits and war taxes to fall back on. The Government balanced high profits with high taxes.

At the same time the War Industries Board did not fall into the error of being indifferent to prices because taxes would bring most of the extraordinary profits into the Treasury. It perceived the far-reaching evil economic consequences of varying and mounting prices in raw materials. A remoter point of importance was also the fact that if American steel prices were forced too far below the existing British prices, there would be a temptation to purchase excessive amounts of steel in America at the expense of American manufacturers. So it contented itself with generous fixed prices — but which were far below those that had been prevailing. The market was so erratic that it is difficult to say just what were prevailing prices, but certainly coke had been \$12.75 a ton; pig iron \$60; steel bars \$5 a hundred pounds; shapes \$6; and plates \$12. The established prices were much higher than those of the pre-war period, but they were not out of line with the general increase in prices of commodities and of labor. Following the fixation of prices in the basic materials all steel products were later priced accordingly.

The steel industry accepted the new prices in good faith, the American Iron and Steel Institute appointed a coöperative committee, and from that time on, as experience showed the way, the iron and steel industry virtually became a department of the Government. It pooled its resources and, through the Institute committees, put them at the service of the Gov-

ernment. The War Industries Board set up a steel division under Replogle, himself an acknowledged master of the business, and between that division, in touch with the needs of the Government and of war industry and the committee thoroughly conversant with and acting for the steel industry, American steel and iron making was treated as a unit. Synchronously with the fixing of steel prices, the War Industries Board laid down the general basis of the distribution of the product through its Priorities Circular No. 1, which established the sequence in which orders should be filled; and Circular No. 2, explaining the use of priority certificates. Thus Government price-fixing and Government allocation of products made their *début* simultaneously.

It is not to be assumed that the new partnership of Government and steel was always harmonious. The steel men were loath to believe that the war demands for steel were as great as the Board maintained they were. They were reluctant to give all their production to the Government and the Allies: they hated to shut off their old customers entirely. Yet the production of iron and steel was less in 1918 than in 1917, though it is agreed that prices had nothing to do with this fact.

Replogle, in despair as he saw production falling behind, especially in the disastrous winter of 1917-18 — the worst in a hundred years — called the steel men into conference with the Board on several occasions. The minutes of these meetings show how the friction of war effort wore out nerves. At times the Board members were convinced that the steel industry was not doing its best, and, on the other hand, the iron and steel men, conscious of maximum effort, resented the slightest criticism. At the same time these meetings were really councils of war in which the whole situation was exhaustively discussed and reviewed, and the best minds of the industry were concentrated on ways and means of breaking up the vicious circles of relations which seemed to block at every turn every effort toward increased production.

How far the hard industry of iron and steel had progressed from the acquisitive days of 1917 was fully expressed by Judge Gary when he said at one of these conferences that the

steel industry, under Government control, had become such a unit that no member of it any longer had any right to conduct his business with a view to individual profit; that it was simply an integration that must be treated as having only the one purpose of serving the war purpose. He thus disposed of the last hope of some of the steel men that they might now and then fill private orders — when for the moment Government orders were off their books. If such a situation arose, the free mills had to come to the relief of the congested mills.

It is not surprising that in such a robust industry as that of steel and iron, in which the tenacity of the product seems to be reflected in the character of its managers, there should have been some recalcitrants — some of the “I-will-do-with-my-business-as-I-damn-please” type. The priority clamps — the blockade of industrial manipulation — and the threat of taking over the plant finally brought all into line.

Because it was the first and, all things considered, the most important of the industries dominated by the War Industries Board, in addition to being the greatest, the steel administration provides the best model of the scheme of industrial control through a compact, expert unit on the side of the Government, dealing with a close organization on the side of industry. For integrated administrative purposes this industry had the advantage of being already much centralized. In the first place, the Steel Corporation represented about fifty per cent of it, and in the last analysis about fifteen men could swing the whole of it. In the next place, the long-established American Iron and Steel Institute had given the industry an advantageous rallying-point. After the agreement of September 22d, Judge Gary, as president of that Institute, appointed a general committee and a number of sub-committees to direct the industry in coöperation with the War Industries Board. Judge Gary was chairman of the general committee and the other members were:

J. A. Farrell (vice-chairman), president, United States Steel Corporation, New York, N.Y.

E. A. S. Clarke (secretary), president, Lackawanna Steel Company, New York, N.Y.

L. E. Block, vice-president, Inland Steel Company, Chicago, Ill.

J. A. Burden, president, Burden Iron Company, Troy, N.Y.

J. A. Campbell, president, Youngstown Sheet and Tube Company, Youngstown, Ohio.

H. G. Dalton, Pickands, Mather and Company, Cleveland, Ohio.

A. C. Dinkey, president, Midvale Steel and Ordnance Company, Philadelphia, Pa.

E. G. Grace, president, Bethlehem Steel Corporation, Bethlehem, Pa.

A. F. Huston, president, Lukens Steel Company, Coatesville, Pa.

W. L. King, vice-president, Jones and Laughlin Steel Corporation, New York, N.Y.

C. M. Schwab, chairman, Bethlehem Steel Corporation, New York, N.Y.

J. A. Topping, chairman, Republic Iron and Steel Company, New York, N.Y.

H. H. Cook (assistant secretary), American Iron and Steel Institute, New York, N.Y.

An elaborate organization was set up in Washington and the head offices in New York were largely given over to war work.

On his part Mr. Replogle set up a staff with Frank Purnell as assistant director and E. D. Graff, special agent; a steel products section with F. E. Thompson as chief; a projectile steel, rails, alloy steel, and cold drawn section, with Captain D. E. Sawyer as chief; a pig iron section, headed by Jay C. McLaughlan; a permit section, headed by J. S. Barclay; a bureau of warehouse distribution, with Andrew Wheeler as chief; an iron and steel scrap section, with William Vernon Phillips as chief; and a statistics section under Percy K. Withey. Paul Mackall, another of Mr. Replogle's assistants, later became the Division's representative on the Board's Foreign Mission.

The success of the Steel Division was founded on its mastery of the facts of the industry, as well as the expert knowledge of its members. Every bit of information at the disposal of the Government and the Allies regarding steel requirements and purchases was collected and put in order. Every iron and steel plant in the country was required to make weekly reports, giving all the essential facts of the state of its business. Agents of the Division and of the Institute visited different plants from time to time. Lagging

plants were speeded up, prompt ones were encouraged, violations of priority were reprimanded and even penalized. A steel committee composed of the principal members of the Steel Division and representatives of the Government departments and agencies using steel met almost daily to keep the requirements side as up-to-date as the production side, and to consider measures to meet the ever-changing situation. The general outcome was an almost incredible direction of the iron and steel industry as a unit, of which the different plants were merely subordinate parts. As offense and defense alternated in France, as the requirements of the railroads, the shipyards, the munitions plants varied in relative importance from day to day, mills and whole plants were speeded up or shifted from one product to another. There was a strategy of steel in America that was as much directed by events as the strategy of armies in France.

The steel forces were as much discouraged by the awful sag in production in the winter of 1917-18 as the French and British by the destruction of Gough's army in March, 1918. On May 7th, Mr. Replogle, speaking at a meeting of the War Industries Board with the representatives of the automobile industry, drew a vivid picture of the steel situation. He showed that there were then orders on the books of the steel mills for seven months' production, and more orders coming in all the time.

As late as August 22d, Mr. Baruch, speaking to the steel men, pictured every offensive of the war as dependent on steel:

Every place where there is an Allied army, no matter whether it be Italian, French, English, or American, there is a demand upon the resources of this country. The figures we have represented to you we can add to because we have additional demands for the Mesopotamia campaign. The whole Siberia project rests upon whether we can support the men there with material. As soon as that advance starts, it means steel. The whole question on the western front is a question of metals. It is not to get steel there in January or February — not even day after to-morrow, but to-day. We must have the weight of metal. If we cannot carry out this programme, I want to know it from this meeting. If we cannot do it, it is time for us to inform the military chiefs on the western front. We must say: "We cannot support you. You have got to sit there and wait

or go back because we cannot support you." It is really up to that. You have all done wonderfully in a great way, and personally I appreciate it, but if we cannot meet this demand — if you think we cannot — let us say so and give them the facts.

Viewed in the whole the outlook did seem hopeless. But the steel industry met every decisive crisis, though it was able to do so only by virtually ceasing to produce steel but for war purposes, primary or secondary. The conservation of steel for war got to such a point that it was even denied to the corset manufacturers, who consumed only twenty-five thousand tons a year, until it was shown that corsets were a necessary of war — that women workers could not stand up to their work without them — when a certain amount of "off-grade" heats was allowed them. Some of the steel-consuming interests "died hard" as curtailment went on and priority choked off supplies. Step by step, however, the lines were tightened up, and Priorities Circular No. 5, of July 22, 1918, took away the last vestige of control of the steel manufacturers over their own product. After that date no steel manufacturer could deliver goods, even if he had filled all his Government orders, without approval of the director of steel. Thenceforth no steel-using industry could continue except by grace of the War Industries Board. All this was effected with an executive and clerical force that did not exceed a hundred persons, thanks to the fact that the industry largely directed and policed itself. The more arbitrary and authoritative system of administering steel priorities in England employed three thousand persons.

While it is dangerous to attempt such a generalization, the impression is that the Steel Division came nearer to being an absolute industrial control agency of the Government than did any of the other subdivisions of the War Industries Board. Of course, it did not sign contracts and make payments, but it allocated virtually all the steel and iron requirements of the United States Government and of the Allies. It could hardly have made effective use of the pooled resources and facilities of the steel industry if it had not done so. Operating under basic fixed prices, it was not involved in any price bargaining or influenced by relative prices as balanced against comparative efficiency. So far as the work

already in hand permitted, it was free to place each contract in the plant that was best adapted to filling it. In this part of its work the Steel Division worked in the closest union with the steel distribution sub-committee of the American Iron and Steel Institute, of which J. A. Farrell, president of the United States Steel Corporation, was chairman. In this connection it should be mentioned that the Institute, in addition to this committee, had other sub-committees on sheet steel, ferro-alloys, pig iron, iron ore, and lake transportation; tubular products, tinplate, pig tin, scrap iron and steel, wire products, wire rope, cold rolled and drawn steel, malleable castings, cast-iron pipe, and traffic conditions. Each of these articulated with the appropriate section of the War Industries Board.

Allocation was not confined to original orders, but was even applied to the extent of shifting work in hand, in order to consolidate projects and eliminate cross-hauls and unnecessary hauls. For example:

A Buffalo steel manufacturer was making an enormous tonnage of projectile steel to be shipped in bar form to a Cincinnati forge plant to be forged into projectile forgings, which were in turn to be shipped back to Buffalo for machining into the finished projectile. A plant within fifty miles of Cincinnati was making projectile bars which were being sent to Buffalo for forging and machining. The differential in price of the several contracts was very great, but, after a number of conferences which the director of steel supply had with the various manufacturers involved, arrangements were made to have the steel bars rolled in Buffalo, shipped to a near-by plant and machine shop for finishing, and in turn the Cincinnati forge man was supplied by the steel mill in his district.¹

The Distribution Committee not only acquitted itself well in placing and shifting orders, but was often instrumental in providing new plants. The Liberty Plate Mill of the Carnegie Steel Company at Pittsburgh, for example, was rolling plates for the Hog Island shipyards ninety days after ground was broken for its foundations. Incidentally, one of the great achievements of the war was the work of the steel

¹Report of the War Industries Board. Government Printing Office, Washington.

rolling and steel fabricating mills in delivering the parts for the fabricated or assembly shipyards, such as Hog Island, Bristol, and Newark. Forty or fifty mills, scattered all over the country, coöperated in this undertaking. On one occasion Mr. Baruch casually remarked to Judge Gary that the country was deficient in forging plants. Without more ado orders were issued the next morning for an \$8,000,000 extension of the Steel Corporation's forging capacity.

The fact that a long time elapsed before the War Industries Board was in full control of industrial mobilization and industries were integrated for war purposes resulted in an immense amount of wide diffusion of "jobs" that were really units, causing much waste of transportation, confusion, and loss of time.

The volume of steel production was definitely limited by the production of iron, which — though greatly enlarged in the three preceding years — it was not possible to increase during 1918 (though by various devices and contrivances the capacity was enlarged). Another limitation was the necessity of concentrating the mills on a few lines such as projectile steel, ship plates, and rails. This involved extensive conversions and the erection of new plants. The Steel Corporation alone was at one time spending about \$14,000,000 a month on new plants.

Very little projectile steel was made in this country before the war, and there had not been a large demand for rails in recent years. Nevertheless, the output of projectile steel in 1918 was 4,119,099 tons and in October shipments were averaging 115,000 tons a week. At that time France was getting 110,000 tons a month, England 85,000, and Italy 20,000. While the steel was produced to keep the Germans on the run before the hot guns of the Allies, transportation was maintained both abroad and at home. The total production of steel rails during 1918 was 2,372,691 tons. In the month of September alone 60,000 tons went to Pershing and in the year the American army got 305,000 tons, France 212,450 tons, Italy 64,484 tons, and the American railroads 1,263,720 tons.

In the beginning of the war it was not thought possible to provide sufficient steel for the proposed emergency fleet,

hence the recourse to wooden ships; but in 1918 the Fleet Corporation received 2,132,907 tons of plates; the American railways, for cars and locomotives 1,100,000 tons; Canada, 53,178 tons; England, 101,365; France, 92,918; Italy, 56,595; and Japan, 100,284. At times the shipments of plates exceeded 120,000 tons a week.

Allowing for duplications in reports — as when one plant made some steel product from billets received from another — it was calculated that the net production of steel during 1918 was 33,000,000 tons, although the nominal production was almost 39,000,000 tons. The steel production capacity extended so much more rapidly than iron production, which, despite the use of every old blast furnace in the country and the conversion of foundry furnaces to basic iron, was definitely checked by the fuel factor, that it is doubtful if the record for 1919 would have been any better if the war had continued, except as a mild winter would have helped as against the curtailing effects of the terrific winter of 1917-18.

II

ONE of the agonizing industrial tragedies of the war was the gradual extinction to which the passenger automobile industry was eventually sentenced. It was the greatest of the industries that were singled out, not only for curtailment, but for one hundred per cent conversion or repression. The automobile makers had always been sensitive to the intimation that their business was a luxury, and they resented its implied classification among the non-essential industries during the war.

Owing to its size, it became a mark for curtailment when many wholly wasteful businesses were permitted to continue but slightly impeded. It was an enormous consumer of steel — two million tons a year — and steel, as we have seen, was the crux of the war. It employed an army of men who could be used in other industries or in the ranks. The more automobiles, the greater the drain on motor fuel, already scarce; and the greater the demand for rubber for tires.

Finally, when all is said and done, the country could easily have got along without further production of passenger auto-

mobiles for a year or two, just as it could have got along if there had been no new clothing manufactured for civilian use for a like period. The difficulty was not in dispensing with new passenger automobiles for a time, but in conserving the life and well-being of the communities that are so largely dependent on the business and in making conversions without the dispersion of forces and the breaking-up of organizations. The fact that in a sense they had been singled out for sacrifice *en masse*, and the natural tendency to believe that they were the victims of war-industry enthusiasts, put the automobile men into a rebellious state of mind. Virtually all of them were for a long time passive obstructors of curtailment, and some were defiant.¹

This attitude, in turn, caused an unfavorable reaction among the war administrators who realized that steel was the metal of victory, that the maximum output of it had been attained while war demands for it were increasing. The axe must be applied some place and preferably where there would be large and immediately available results. The automobile passenger industry stood out in this view like a tower on a flat plain.

When the screws of priority were first applied (because of the scarcity of alloy steels) without warning in November, 1917, there was, naturally, a violent storm of protest. In the following March an agreement was made with the War Industries Board to restrict the production of passenger automobiles to thirty per cent and prepare for eventual elimination. Nevertheless, according to the Board's information, many concerns proceeded to store up materials and supplies instead of balancing their inventories and tapering off. A certain great manufacturer even challenged the War Industries Board to do its worst, accompanying his challenge with a personal insult to the chairman. He had materials and fuel in abundance and thought he could stand a state of siege. No retort was made, but when his coal pile was ordered to be commandeered and the Railroad Administration

¹On one occasion, so tense was the feeling, the three members of the committee representing the automobile industry came into the writer's office greatly exercised, and the chairman of the committee said to the writer: "If this persecution continues, we are going to hire the best publicity man in the country to put our case before the public."

refused him cars for any purpose, even for his Government business, and it came to his ears that he would soon be taking orders from a smooth-faced lieutenant, if permitted to remain in his own plant at all, he saw a great light. He saw not only his folly, but also his selfishness. His submission was characteristically picturesque, and not wholly printable, but it was submission.

So, when the War Industries Board called the representatives of the automobile industry together to confer regarding a definite limitation of the output of passenger cars, preparatory to ultimate conversion of the whole industry to war service, there was hard feeling on both sides. The automobile men considered themselves sacrificial victims of somebody's foolish ideas of how the war should be conducted and the members of the War Industries Board considered that they had to do with a heartless industry which had already made them a laughing-stock.

The first engagement occurred on May 7, 1918, when representatives of the National Automobile Chamber of Commerce met with the members of the Board. While, as pointed out, other considerations pointed to the suspension of the making of passenger automobiles, it was almost entirely on the steel factor that the Board took its stand. Mr. Replogle briefly stated the steel situation after a winter in which transportation was incommoded to such an extent as appallingly to reduce the production of steel for a long time. There were eighteen months production orders for standard steel rails, on the getting out of which depended the circulatory system of the Nation; the mills had twenty-four weeks of work on sheets; twenty-seven on seamless tubes; thirty-three on structural shapes; twenty-eight weeks on bars (in which the automobile manufacturers were chiefly interested); twenty-three weeks on tinplate; tubular products (also much used by the automobile industry), twenty-eight weeks. Altogether the entire steel industry had thirty weeks' demand on its production at the then rate of shipment. Also the demands were to become larger, and deliveries to some of the Allies "were in frightful shape — and we've got to make them up." The steel capacity was greater than the output, he admitted, but pig iron was the curb —

"and that in turn goes back to fuel and transportation."

On behalf of the automobile men and speaking for about ninety-eight per cent of the automotive industry, exclusive of the Ford Motor Company, which is not a member of the Automobile Chamber of Commerce, Mr. John Dodge replied with an "offensive defensive." In plain words he said that the whole steel and iron industry from ore to finished products was down and lagging and boldly laid the responsibility at the door of the Government.

If a steel mill is down even ten per cent [said Mr. Dodge], the Government should go and find out why it is down and remedy the trouble. I believe that with proper Government assistance these steel mills could be brought up to one hundred or even one hundred and twenty per cent capacity. The steel mills don't know whether they are to roll Government stuff or our stuff. If the orders were placed by the Government as a private concern would place them, there would be ample supply to meet all demands. It should be the effort of the Government to build up industries and not destroy them. It takes little ability to get a crowd of men down here and say, "You must cease manufacturing automobiles," but it takes a whole lot to speed up all the other industries. . . . If this policy were pursued we would not have to be called to Washington. No one ever questions in the least that our Government comes first; every one knows that. But there is no reason for the Government's building stuff and storing it, as I was told yesterday, that couldn't be shipped in five years. . . . If you give us this assistance, if you give these mills and furnaces the proper assistance, we would have plenty of pig iron and we wouldn't need to be curtailed; and if you would just take the material that you actually need and leave us alone everybody would be satisfied.

These were hard words, but it is characteristic of the tolerant methods of the War Industries Board that Mr. Baruch answered calmly that the Government was doing everything in its power and that he would be greatly pleased to know more about the Government "stuff" that could not be shipped for five years. Mr. Dodge cited an unnamed high Government official as his authority, thus touching one of the plagues of Washington during the war — the reckless remarks in private conversation by Government officials who did not know what the facts were any more than the man in the street.

What has Mr. Replogle done to increase the pig iron and scrap production? [Mr. Dodge demanded.]

Mr. Replogle: We have done everything of which we are capable.

Mr. Dodge: In new furnaces?

Mr. Replogle: I have discouraged the building of blast furnaces. The existing furnaces are not kept operating at full capacity because of lack of fuel. This is not a question of pig iron capacity.

Mr. Dodge: In other words, you mean to say that if the industry was supplied with transportation and fuel there would be more steel.

Mr. Replogle: Certainly there would be enough. It would at least take care of a great portion of the commercial interests. We have even advocated the closing-down of certain blast furnaces where the coke consumption per ton of metal is high, and putting the coke out to more modern blast furnaces. One furnace can make a ton of pig iron with 1700 pounds of coke, and another furnace may take 2500 or 2600 pounds. That is very drastic when a man who has a less modern furnace would have to shut down, but I think, sooner or later, it is bound to come to that point. That is the limiting fact, Mr. Dodge—the fuel, the coke— In that connection the Government is spending a vast amount of money right now. The manufacturers themselves are doing a great deal along that line. A modern coke oven costs to-day \$50,000 to \$52,000, which is three or four times what it would cost in normal times. But the Government is encouraging that and advancing money to people who are prepared to build such ovens—in some cases advancing one hundred per cent to cover the cost of the by-product oven, which Mr. Baruch has encouraged to the fullest extent. They will not be available for a long time to come, however. . . . It is problematical just what benefit will be derived from these coke ovens. There are many cases where loaded cars of coke have been standing on sidings for days, because of the inability of the transportation people to move them. I think that situation has improved materially, but it is still far from being solved.

Mr. Dodge: It appears to me that what you need is one big boss to get these departments together and shake them up and get results.

Mr. E. W. Durant, of the General Motors Company, then made a strong appeal for the maintenance of the automobile organizations for the good of the country and for the good of the Government, pointing out that if they were impaired then, they would not be ready for future Government demands upon them.

At this point, Mr. Noyes, speaking for the Fuel Administration, said:

The actual facts of the fuel question are that the fuel situation for industrial coal is going to be immensely worse next winter than last—no question about it. It can be figured out by the ton. It is a business that cannot be placed in the hands of some Napoleonic man—in that respect it is unlike any other business. In any other business, I agree with the ideas of Mr. Dodge—any other business would say that it has got to be done. When you get to the coal business—you don't realize it is so far out of range. Remember that our weekly stunt is to produce twelve million tons of bituminous coal. We have gone through the whole line—there is not a single item from barge canals to little canals, the question of taking boats from the Lakes, from Montreal, and running them down to New England—when you get through all that, you are not going to be able to meet the demands for coal this winter. When the big war came on every railroad man testified that it was just taxing the railroads to do what the normal business of the country required to be done. Frequent embargoes were necessitated then. Now you have put on such an enormous increase that it cannot be possible to meet it in one year, and the great bulk of that increase is coal. Three years ago you were mining 440,000,000 tons of bituminous coal; this year it is figured at the least estimate you must have 600,000,000 tons of bituminous coal. You will need 160,000,000 tons more than you needed a year ago. This is a problem you cannot conceive—it simply cannot be done. Somebody has got to take a short path somewhere. The increases used to average 50,000,000 tons of coal and there would be a struggle over that. This year to supply the actual necessities that can be figured, you need at least 70,000,000 tons and possible 75,000,000 tons more than you had last year of bituminous coal. Every pound must be carried on railroads that must be taxed in the same percentage on other supplies. There is going to be a world shortage of coal for industrial purposes this year over last.

Then Mr. Legge reviewed the general industrial situation, saying:

It was difficult for me in a period of months to grasp what this situation was all about. I confess that I was taught to understand what Mr. Dodge says was one of the first difficulties—the big supply of coal that formerly came into New England from Nova Scotia fields was first stopped. The next item was the large supply

of Mexican and Texas oil carried by tankers. These tankers were taken off because we had to supply the fleet of our Government, and other fleets, with fuel oil abroad. That meant that these industries up in the Atlantic woods had to depend on coal as the oil supply was cut off. The Shipping Board had one hundred and twenty boats under construction in the Lakes, all of which was promised to relieve the situation. Ten per cent of them were to carry coal from Hampton Roads — from New York to New England. Unfortunately, things have occurred on the other side and the first fifty of the one hundred seven have already been requisitioned to help General Pershing. That is how our plans got shot to pieces. Coupled with that, the character of freight must be moved from the northeast corner. The railroads are handling twenty-two per cent more freight in that northeastern territory, east of Pittsburgh, than was ever handled before in American history, and it is nowhere near enough. They tell us they have reached their maximum not only of motor power, but yards and terminals, and it cannot go much further. They are handling through each of these gateways in that country, the maximum number of cars they are capable of handling. The B. & O. Railroad recently tried to get the coal cars to raise it to two hundred fifty cars a day. They absolutely fell down. It has not been one thing, but a hundred and one things to bring about conditions. The Government's building programme of this year, in dollars and cents, is equal to the entire building programme of any year prior to the war. Everybody believes we are not doing any building. Those are the facts, when you get down and analyze what has happened. Nobody likes this programme here — Mr. Durant says it is destruction. We have gone behind every month for the last six months. There has not been one week that we have been able to meet our obligations from a military standpoint. We have been going back, back, back. On top of that comes the call for an increase in the army of three million. Simultaneously comes a call from England, France, and Italy for more steel, beyond any estimate they have ever given us. They have got to come back to us for more metal — that is dumped right on top of the programme. By the time you think you are to get some daylight, it gets worse. For us to sit in this meeting and not lay all the cards on the table, I think would be criminal. No one wants to stop you for a minute, and you ought to know something of what the problem is, and then, as the chairman says, if you can offer any suggestions to help us work it out, that is what we are here for. In this building programme down here, our contractors notify us that we are up against it on concrete. The cement mills in the East will close down for

lack of coal; the cement mills in the West will close down for lack of transportation. We ask the Railroad Administration about it, and they answer, "Do you want to haul cement or haul coal? — tell us what to haul out. We cannot do anything unless we sacrifice some freight." If you gentlemen have a notion that this is a hobby, please get that out of your minds and get the idea of just how serious it is and tell us what you can do to help. It is not only to take care of our own army — do not get a wrong impression — but when England ran short of material, they came here; when France ran short, they came here; when Italy ran short of material, they came here. Those Allied nations are spending every month in this United States \$500,000,000 for war supplies of one kind or another — half a billion dollars being spent on an average every thirty days, all of which has to come out and be taken care of somewhere, somehow. It is not for the consumption of the small army that this country has abroad — we have got to take care of the other fellow. As I said before, we are going back. Deferred deliveries have grown on us week by week for the last six months — that is as I see the situation. Look at it and make the best of it.

Frank as the presentation of the conditions facing the Board was, it developed that its members did not feel it was proper to disclose to a large gathering all the confidential facts regarding the desperate position of the Allies and the general movement of the war at that time. It was agreed to disclose every fact to a committee of five, and the rest were to accept their word for it.

This showing appeared to be conclusive at the time, but later it appeared that it was not. The automobile men felt that, although the Government requirements were appalling as presented to them, after all far more was being currently required of industry than could be used. Unquestionably there was a deal of truth in this position, but after the most solemn warnings the requirement agencies were unable to report to the War Industries Board any important reductions. The War Industries Board had no choice but to act according to military demands. The situation was further embroiled by the action of Chairman Edward N. Hurley, of the Shipping Board, who in addressing a meeting of the motor manufacturers told them in effect that the situation was nowhere near so bad as it had been represented.

Also, it was known that Judge Gary was an optimist on the outlook for steel production and confident that the Government was over-buying. Mr. Stettinius, then an Assistant Secretary of War, also gave the automobile men some comfort. As both the War Department and the Shipping Board were at that very moment clamoring for steel and more steel, and complaining that their work was being held back by lack of steel, and the steel men were complaining that they could not get coke and transportation enough to run to capacity, the War Industries Board was highly exasperated and adopted some rather sarcastic resolutions which pointed out the inconsistency between the demands of the War Department and the Shipping Board and the public utterances of Messrs. Stettinius and Hurley. Judge Gary even submitted a request to be permitted to supply steel to the city of Chicago for some municipal construction. With a reference by Mr. Legge to the "German Mayor of Chicago," this petition was peremptorily rejected.

In the end the committee of the Automobile Chamber of Commerce, which attended the May 7th meeting, declined to take the responsibility of imposing on the industry the programme of drastic curtailment and ultimate abandonment of the passenger automobile business favored by the Board. But as it was obvious that the Board would act without the coöperation of the industry, if necessary, Mr. Hugh Chalmers was designated to make the final stand, independently of the permanent national organization, although he was accompanied by General Manager Reeves of that body. It was on July 16th that Judge Parker, speaking for the Board at a meeting of the Board members with Mr. Chalmers, announced that the Board had concluded that the passenger automobile business would have to be liquidated, and would be permitted to acquire only such materials as were sufficient to round out stocks on hand and limited during the liquidation process to twenty-five per cent of 1917 shipments of cars.

There followed a debate that was as frank and plain-spoken as the one at the preceding meeting. A great industry — the third in the country — was pleading for its life. It considered that it was to be made the unnecessary victim of Government industrial mismanagement. On the other hand,

the Board members, though not without sympathy, were coldly of the opinion that this industry was willing to take a chance on there being enough steel for war purposes if it could get enough to continue making vehicles without which the country could get along for a period.

Yet it was plain that, while the industry resolutely opposed suppression, it was not so much that fate it resented as it was the implication of non-essentiality. It vigorously objected to being the one great industry singled out for sacrifice. Of course, the Board had never considered it a non-essential industry, but had come to the conclusion that it was the one enormous consumer of steel without whose product the country could get along for a while. If it had to die, the industry was prepared to accept its fate, but it wanted to be allowed to die by starvation rather than by proclamation. In other words, it wished to escape the notoriety of decreed curtailment, and pass off the stage through the operation of the established rules of priority. It could not get away from the feeling that formal curtailment and extinguishment was dissolution with a brand of ignominy. On the other hand, members of the Board pointed out that, without a definite starvation ration, the application of priority would instantly shut up every plant that did not have a complete store of materials on hand. Even then Mr. Chalmers stood firmly on the ground that the industry preferred to take its chances rather than a lean ration. Replying to Judge Parker, he said:

That is the beginning of the end. You may not pay any attention to what I say, but this is the most serious mistake you have made down here. It means that these men will have to go to the War Department and ask for postponement of dates of delivery or cancellation of contracts. Here is another issue. Ford has been able to get his steel. This won't affect Henry Ford at all. Now, how is he doing it? He is getting this steel, that is sure. Henry Ford has been favored down here, because he has got his requirements, he has got his steel. Here is one concern, the Lexington-Howard Company—they came down here and begged to get \$190,000 in steel and they would sign an agreement to go out of the automobile business, but they didn't get it. If you put that act through you will precipitate the worst panic the country has ever seen, and I am your friend in telling you so. It

is really ridiculous to put such an order into effect. They will have to go out of business. You might as well appoint a receiver for the State of Michigan, for it means a panic in the country — absolutely so. There are over 300,000 men in Detroit in the automobile industry, and for you to do that now will certainly mean a panic. If you were to say twenty-five per cent even then twenty-five per cent wouldn't be enough to keep the organizations alive, but you say, "We want you to liquidate, but at the same time you can't ship over twenty-five per cent," and when it is shown that the great purchaser Henry Ford with his \$400,000,000 plant can be favored, to get his steel for the production of fifty or sixty thousand automobiles a month, I think there will be some question. We know Ford is getting his material, but of course we don't admit there has been any discrimination.¹ He has enough steel on hand to go ahead with his production.

I say it would be much better than to put a ruling of that kind into effect to let these companies go on as they are, taking their chances of getting material to even up these industries, because without discrimination on your part, we feel that we can get some steel, that is, we may get some. Now you are not going to discriminate against this industry in favor of any other non-war industry. It would be better for us to go on as we are than to accept that kind of a ruling.

Mr. Baruch: I don't see any objection to accepting that.

Judge Parker: The steel mills won't fill any order except under priorities or permits. Now they can't get steel except under priorities or permits, and we cannot get them priorities or permits for any amount unless we know what they are entitled to in order that we can put them on a par with other industries.

Mr. Chalmers: Here is another consideration: there are all these dealers through this country and these dealers have a large investment; they, of course, are absolutely flat out of business.

Judge Parker: That is one of the uncertainties of the war.

Mr. Chalmers: If you put that order into effect you will ruin the automobile industry. I think it is for you to save their interest in their business and then talk about your curtailment.

¹Apropos of Mr. Chalmers's reference to Henry Ford, the following paragraph is quoted from the minutes of the Board's meeting on July 2, 1918:

"Mr. Replogle stated that the Ford Motor Company desired 5196 tons of steel per week for the manufacture of 1300 cars per day. They also desire 2100 tons of pig iron per week. They claim their Government work alone takes 1910 tons of steel and 1120 tons of pig iron. It was decided to give them steel enough to take care of their Government work, and give them no assurances of any more. They are under no conditions to receive more than twenty-five per cent of their normal requirements. Mr. Replogle was directed to take up the matter of their requirements with Mr. Hanch." (Chief of the Automotive Products Section of the War Industries Board.)

Mr. Summers: You are assuming a supply of steel available when there isn't.

Mr. Chalmers: We are willing to take our chances. Get your one hundred per cent war programme. We will take our chances of the situation in steel breaking. You are going to force a situation of starved industries in this country; you are accumulating a lot of war materials that cannot be shipped and when that is shown and the industries are killed you will find yourselves in a storm of criticism.

Judge Parker: I am willing to go to the bat with you right now at the elections if you please as to whether we will give the boys in khaki their supplies or give the automobile industries theirs.

Mr. Chalmers: I am not advocating that you don't, and if I had to, to win this war, I would put the automobile industry out of business, if I had to to win the war; but in the absence of definite proof that you are going to use all this, and ship all this, that is a different proposition.

Mr. Baruch: And you would rather take the chance on keeping the industry going?

Mr. Chalmers: I am telling you this, and I think it is my business to tell you because we are not going to sit here and bow our heads. We are the third largest industry in this country, and with all the men we employ and all the obligations we have to our parts people, all the money we owe our banks, we cannot surrender to this. I am only here representing the Association. I am not trying to show you our side of it. Now if you need all this steel—Mr. Baruch, please don't misunderstand me—if you need this steel we won't get a pound of it in the next six months, but we are willing to take our chances that the production of steel will be increased or that there will be a slight diminution in the amount of shipments. If you know what is going through to be shipped, then go and talk to Mr. Schwab as to what the tonnage is going to be. Gentlemen, you have a second thought coming, now that is all there is to it, and in the meantime you have killed industry. You have got to take into consideration men employed on war work who cannot be immediately transferred from automobile work to war contracts. Would you let them go?¹

So great was the demand for steel for war purposes in the

¹The War Industries Board had definite information on all contracts that were placed with the automobile works, having sought to divert important artillery contracts to them in addition to their aircraft contracts. It knew that it could utilize the important automobile works on essential war work and thus avoid any permanent injury to the industry. Subsequent developments showed its position to be correct.

remaining months of the war that it was demonstrated that the Board's plan was essentially far more considerate of the industry than the take-the-chances plan advocated by Mr. Chalmers. The final agreement was that the makers of passenger cars were to be permitted to produce in the last six months of 1918 one fourth as many cars as they had delivered during 1917, and to that end were to be permitted to purchase materials and parts sufficient to match up the stocks on hand. The understanding was that the industry was to shift to war construction entirely in the first part of 1919. Inasmuch as about half the capacity of the industry was already engaged on artillery cars, trucks, tanks, aeronautical motors, airplanes, etc., for war uses and there were many other indispensable products to which it could be converted, the outcome was far from being the terrible fate that had been predicted. Although the passenger automobile men put up the greatest fight of the war against control, they accepted the final agreement in good faith and lived up to it without exception. There may be little in a name, but the early unauthorized and unwise designation of the industry as a non-essential, was undoubtedly the chief cause of the stubborn resistance it offered to curtailment and conversion. To this extent, at least, the Government was responsible for the situation that resulted.

III

APPRAISING mankind as it is and conditions as they were, the writer unhesitatingly gives it as his judgment that the steel industry of America, once it realized the meaning of the war, served the Nation as faithfully as the soldiers in the ranks. It is true that in many instances great profits — too great profits for such a time of national agony — were made, but rarely were they profiteering profits, no matter how large. Under any scheme in which the industry remained in private hands, the Nation was bound to pay too much for a portion of the product.

And there is no reason to believe that it would have paid less under direct public management. There is nothing in the history of governmental administration of the railways during the war to suggest that its steel would have cost the

Government any less if the industry had been taken over, but it was annexed as an autonomous state instead of by arbitrary incorporation. It was a fully controlled instrumentality of Government for results, but it preserved its own internal methods. The relation of the Government to the steel industry, when fully realized, was perhaps the best example the war afforded of the masterly conception of industrial mobilization and functioning by the simple process of establishing effectual contact between a pooled and compactly united industry manned by its own captains and a governmental organism, expert, initiative, resourceful, and energetic. It was a model of that highest and best form of efficiency which President Wilson declared to be "the spontaneous coöperation of a free people."

CHAPTER XIX

THE STORY OF COPPER, BRASS, AND OTHER NON-FERROUS MUNITIONS METALS

The myriad needs for copper — The copper producers fall into line — Forty-five million pounds for the army and navy — Further price agreements — The copper mines deliver — Brass for the merchant ships and navy — Zinc — Aluminum at the Government's price — Antimony for shrapnel bullets — Lead — Nickel — Quicksilver.

THROUGHOUT the war of the nations copper and its derivatives and products were second only to steel as a military material. Brass cannon have long since joined the bronze dagger in museums, but in the rifle cartridges and the fuses and the cases for artillery shells of projectiles, copper, or its alloys, the first metal recovered by mankind, is still a lethal weapon of prime importance.

But it is the industrial implications of modern wars that make copper so important. As a medium of communication alone, for every ton of deadweight, three pounds of copper and brass go into every commercial ship in the shape of tubing, wire, and condensers; to say nothing of all the copper and brass for fittings. Naval vessels likewise require large quantities of the red metal. Almost every engine of war from the hand grenade to the airplane requires copper. The military telephone and telegraph systems of a communication behind the lines and the field telephone and telegraph services of the Signal Corps demand unbelievable quantities of copper. It is consumed in large quantities by the machinery of production in almost every industry that is stimulated by the demands of war. At the pinching off of the St. Mihiel salient, approximately five thousand telephones were used, and more than fifty thousand miles of field wire were laid especially for that engagement.

In copper as in steel, the war in all its stages was based on American resources, and also as with steel it was the

strength of American copper that was one of the decisive factors in the final act. In this final phase the struggle was one between the mines of America and the scrap of Germany. Almost without domestic copper resources, Germany had to fight from stores laid in before the war and from the metal garnered from house roofs and gutters, from church bells and kitchen utensils. As these supplies failed and substitutes failed in efficiency, the industrial barometer forecast the defeat of the Teutonic arms even before it was recorded in lost battles.

Perhaps with design, copper had been lavishly used in Germany in permanent construction and in durable utensils and implements for many years, but the roofs and kitchens even of an empire are no match for the stores of nature in Anaconda, Utah, Bisbee, Miami, and the Copper Range. The German *Hausfrau* might be more docile and more amenable to discipline than the rough and independent copper miners, streaked with alienism, bolshevism, syndicalism, and prone to strike, but the advantage was with them. Producing two thirds of the world's copper, and backed by the refineries of the Atlantic coast and the copper workers of Naugatuck and other centers of preparation and manufacture, the copper mines of the North, the West, and the Southwest, beset by labor troubles, hobbled by the draft, cramped by transportation deficiencies, and sometimes starved for lack of fuel, fed the workshops of the Republic and of the Allies with unfailing streams of the second metal of victory.

The copper men have the distinction of being the industry that sounded the industrial keynote of the war — the note of service and of repudiation of profiteering. With the industrial compulsion of later war times yet unrealized, with all their output in eager demand by Allies and neutrals, and with prices soaring beyond the dreams of avarice to three or four times pre-war levels, they cordially met the Government's initial requirements at something less than half the prevailing prices.

One of the small measures of preparedness tolerated by a great people involved the purchase by the army and navy of 45,000,000 pounds of copper somewhat before war was

declared. The negotiations were entrusted to Mr. Baruch, who was then chairman of the Committee on Raw Materials of the Advisory Commission of the Council of National Defense. He in turn advised with Eugene Meyer, Jr., who was a prime mover in the matter, and other business men. Meyer suggested that a straight-out appeal be made to the leading copper producers to disregard the market and provide the specified amount of copper at an arbitrarily low price.

Baruch and Meyer called on Daniel Guggenheim, of Guggenheim Brothers, informed him of the Government's need of copper and appealed to him to make a price that would dispel the thought that the impending war was being pushed on by the greed of anticipated profits — a price also that would set an example for all future dealings between the Government and producers and tend to divest the war of that ignominy of blood-sucking profiteering from the public necessity that has produced its swarms of heartless contractors and battle-field ghouls in every war of ancient or modern times. Mr. Guggenheim offered no objections to this appeal and merely asked for time to consult with the other large producers. There were some other conversations on the subject and the representatives of the Council of National Defense made the suggestion that the exemplary price be the average price for the ten years 1907 to 1916.

On March 19th, the chief copper producers, under the leadership of John D. Ryan, united in addressing a letter to the Council of National Defense in which they stated that they would deliver 20,000,000 pounds to the navy and 25,510,000 pounds to the army in approximately equal quantities each quarter from April, 1917, to April, 1918, at the price of 16.6739 cents a pound — that being the actual average selling price obtained by the United Metals Selling Company during the period named. "We offer the copper at this price," said the latter, "notwithstanding our costs for labor, materials, supplies, etc., vary from thirty to seventy-five per cent above the average during the ten-year period, because we believe it to be our duty to furnish the requirements of the Government in preparing the Nation for war with no profit more than we receive from our

regular production in normal times. It is understood that the price quoted above is for the quantity and period of delivery above mentioned."

As orders for copper went during the war, this was not a large order and the saving to the Government — some \$3,700,000 — as compared with the market price was a mere drop in the flood of war expenditures that was to follow, but it was important as furnishing a precedent to illustrate the principle that it was hoped would govern all business men in their dealings with the Government. That the copper men themselves lived up to the principle throughout the war there can be no question. It is true that later purchases were at $23\frac{1}{2}$ cents and even 26 cents a pound, and that at both of the later prices the low-cost producers made handsome profits, but here, as in steel and in other things, it was considered that a cost-plus price, which meant a different price for each producer, was not practicable nor stimulative of maximum production.

As it was estimated that war uses would require about ninety per cent of the total production, it was evident that the stimulation of production was even more important than regulation of prices. Of course, the war and excess profits taxes came in as a sort of rebate to the Government, and there was the recurrent argument that prices did not make much difference, anyway, as the higher the price scale the more the Government's revenues. As has been noted elsewhere, the Raw Materials Committee and the War Industries Board never surrendered to this fallacy, but always strove for the minimum price that would stimulate an industry as a whole, falling back on the excess profits tax merely as a rough corrective of an unavoidable evil. Stability of commerce and industry was one of the essentials of maximum production, for more reasons than one. With erratic and ever mounting prices there would follow a train of labor disputes, runaway costs of living, protective as well as profiteering profits, a huge expansion of war costs and debts, increased difficulties of public financing, and then — after the war — the deluge.

The price of 16.6739 cents, voluntarily named by the large copper producers for the 45,000,000 pounds, was in no sense a fixed price. It was more in the nature of a

dramatic gesture and an expression of attitude. When the army came into the market again in June for 60,000,000 pounds of copper, the market price was 32.57. There was no intention of paying that price, but at the same time there was no expectation that the producers would match their March 19th concession. The 45,000,000 pounds were turned over to the Government without incidental reflection in the wage scale of the miners, which was based on 15-cent copper with a bonus of 25 cents a day for each 2-cent advance in the price of copper. It was evident that with the Government taking virtually all the copper for itself and Allies, the Government price would be the market price.

In June, 1917, the miners were receiving bonuses on a price of 27 cents, and to have accepted as a permanent price the gift-price of March would have meant roughly a reduction of a dollar a day in the wages of the men in the Arizona mines. Notwithstanding the scale, the miners threatened to strike if the price were reduced and in some instances did strike. In the absence of an agreed price, the producers continued to deliver copper to the Government without payment, it being understood that after the Federal Trade Commission had investigated copper mining costs there would be an adjustment.

Soon after the 60,000,000-pound army order, the Secretary of the Navy announced that on further orders for the navy he would pay down 75 per cent of 25 cents, leaving the other 25 per cent as a margin for adjustment. This announcement had a disturbing effect on the Arizona miners, and there was much fear that production would be curtailed, as it was felt in some quarters that 18.75 cents was the price the Government had decided to maintain.

The War Industries Board was convinced that such a price meant curtailment of production, and, through its efforts, it was finally agreed that the cash payment on Government orders would be 22.5, leaving 2.5 cents leeway for adjustment. Then France and England, which had purchased 660,000,000 pounds of copper in the United States during 1916 at as high as 27 cents a pound, came into the market for 77,000,000 pounds, but instead of acting independently and competitively they called on the War Industries Board to deal for them.

The Board met the producers in conference on August 7th and offered them 20 cents a pound for the first 60,000,000 pounds of the copper required by the Allies, it being understood that this price should not be a precedent, but that the final price might be higher or lower, as should be determined later. The Board decided at the same time to commandeer the copper in question if the producers should not acquiesce. Nevertheless, when the Board and the producers met again, the latter were so determined in their opposition to the price of 20 cents, and supported their position so well, that the conviction of the Board as to the reasonableness of the price was weakened. The Board then suggested a tentative price of 22.5 cents subject to later revision. This was not satisfactory, either, to the producers, as they were opposed to the whole principle of tentative prices.

Finally on August 16th the copper producers agreed to deliver the 77,000,000 pounds without price or payment on account until a final price had been established. A little while thereafter the Federal Trade Commission made its report, and after studying it the Board decided to fix a price of 22 cents a pound. Once more the copper producers were called in, for the Board was loath to incur their displeasure and eager to secure their cordial coöperation. There was no optimism about obtaining maximum production by commandeering production, or the mines, smelters, and refiners.

At this meeting the Board stood for a price of 22 cents for refined electrolytic copper for the Government, the Allies, and the public — for a limited period — with the proviso that wages were to stay on the 27-cent level, notwithstanding the sliding-scale agreement. The producers objected vehemently, both orally and by written memorandum submitted later. They implored the Board to make the price 25 cents, and John D. Ryan, president of the Anaconda Copper Company, speaking for the producers, said that at that price the producers would engage to pool and deliver not only the entire production of the United States, but virtually all the copper of the world. The producers said that at 22 cents there was no hope of controlling by voluntary

coöperation the output of the smaller, high-cost producers; that labor troubles would result if the sliding scale was tampered with. The larger producers were frank enough to say that the difficulty as to price was not with them, but that, since coöperation of the whole industry was essential, it was incumbent upon them to stand for a flat price that would make such coöperation feasible. They dwelt on the almost insurmountable difficulties of effectively commandeering the numerous small, high-cost mines, and made the following suggestion:

While some of the low-cost producers will show a large profit at twenty five cents, some of the largest and practically all of the small producers cannot show more than the usual peace-time profit at that price, and if depletion of mines is considered, their profit would probably be less than in normal times at average prices. We believe that it would be in the interest of the Government to pay twenty-five cents per pound and take all of the production of all the mines of the country at that price, retaining all of the copper which is needed for this Government and for its Allies, and selling the balance at the same price, or approximately the same price, to the public.

Finally, on September 14th, the larger copper producers met in New York and with only one dissenting vote agreed to make the Board a compromise price of $23\frac{1}{2}$ cents. At that price, John D. Ryan, chairman of the Copper Coöperative Committee, wrote the Board, "We would still be able to get the practical result that we are aiming for, that is, pretty nearly maximum production; therefore, I would say that if your committee would agree to $23\frac{1}{2}$ cents, we can pledge the copper industry almost as a whole to use every possible means to secure a maximum production and to maintain the present scale of wages, and I am satisfied we can succeed."

This proposition was accepted by the Board and approved by the President, it being specified that the agreed price should prevail for only four months. During that period consumers and producers were invited to present objections to the new price. Many of the latter did so, but no consumer objected. Besides maintaining wages as they were, it was agreed that the negotiated price should prevail for the Government, for the Allies, and for the public, and that

the producers should loyally exert themselves to maximum production and keep the metal out of the hands of speculators. So many complaints of the agreed price were received from the small producers and the need of copper was so great that in the summer of 1918 the price was advanced to 26 cents.

Under the coöperative agreement the committee of the producers became the sole medium of commercial relationship between the Government and the producers. No copper was sold except on the approval of the committee, and private consumers were restricted to the smallest possible current demand, no stores being permitted. The two leading copper selling organizations took over the details under the direction of the committee, which followed the wishes of the War Industries Board. United States Government orders were attended to by the United Metals Selling Company, while the American Smelting and Refining Company looked after the requirements of the Allies.

On the part of the War Industries Board the administrative contact with the copper industry was through the Non-Ferrous Metals Section, which was organized in October, 1917, with Eugene Meyer, Jr., as chief, assisted by O. F. Weber, H. B. Moulton, and E. N. Feidman, and, later, by Pope Yeatman. When in March, 1918, Mr. Meyer became a director of the War Finance Corporation, Mr. Yeatman became section chief. Some months later the section was designated as a division with Mr. Yeatman at its head, his staff including E. Coppe Thurston, Erwin H. Cornell in charge of lead, George T. Stone in charge of zinc, assisted by Andrew Waltz, and Lieutenant H. R. Aldrich, statistician.

Although Government requirements were put as high as ninety-three per cent of the supply, there was never any real shortage of copper during the war, despite the fact that the refinery output was less in 1918 than in 1917. The mines and the smelters, on the whole, increased production in 1918, as compared with 1917, although they labored under many difficulties, such as the military draft and the labor competition of the mushroom war industries.

Transportation and fuel were rarely problems for the mines and smelters, which are mostly in the West and,

therefore, outside the congested region; but it was otherwise with the refineries located, largely, on the Atlantic coast in the midst of the congested region and fed with "blister" from the smelters by a long haul. In addition to new copper there was an increase of one hundred per cent in 1918 in the recovery of secondary copper from furnace ashes and cinders, waste and scrap. Even in 1917, when there were disastrous strikes in Montana and Arizona, the mines and smelters put out more copper than in 1916, the production in that year being 2,428,000,000 pounds, or fifty-one per cent more than in 1913. Truly, the copper armies did their part in a war that was so largely decided in the industrial home sector.

But copper is only a raw material, and after the mines, smelters, and refineries had done their work, there remained the problems of direction and control of manufactured products in the form of pure copper and the alloys; brass, cupro-nickel, German silver, and white metal. To deal with this stage of the industry, the War Industries Board established a brass section in April, 1918, Everett Morss being chief. This section concerned itself with brass and copper products in the form of rods, rolled sheet, and strips; tubes (brazed, welded, and seamed), wire, and all other non-ferrous alloys.

The greatest task before the section was that of meeting the demands of the Emergency Fleet Corporation and the navy for tubing. The known navy requirements for special tubing were 1,355,000 pounds and 500,000 pounds of incidental tubing. Moreover, it was estimated that 2,000,000 pounds more would be required for condenser tubes. These were considered the minimum, but in addition there were large numbers of naval ships building in private yards, the requirements for which were not known, though it was ascertained that every destroyer would need 59,694 pounds of brass and copper tube. The average merchant ship built by the Fleet Corporation required 24,000 pounds. This meant that in 1919 the emergency fleet would have consumed 45,000,000 pounds of tubing, or one third of the total production. A coöperative committee of tube manufacturers with Mr. John P. Elton, vice-president of the American

Brass Company, as chairman, was formed and the whole field of stimulating production, increasing facilities, standardization, conversion, and conservation was thoroughly covered.

Toward the end of the war a very serious situation developed in brass products. At the end of August, the army, the navy, and the Allies were calling for 1,140,000 pounds of rod, 3,220,000 pounds of disks and sheets, and 325,000 pounds of cupro, and the production was alarmingly less, although the nominal capacity was about the same.

In August the mills were short 9600 men, and the influenza epidemic reduced the number of men in the Connecticut region to fifty per cent of normal. At the same time the requirements for brass rods and disks, used in cartridge-case manufacture, from the French and Italian armies as well as from our own Ordnance Department, suddenly exceeded all estimates. It was then necessary to put the industry under strict control, and at that no source of supply could be found for sixty per cent of the demand. The continuance of such a condition meant that in a prolonged war the infantry would be without cartridges and the artillery without cases. The army was called upon to furlough men drafted from the copper-working industries, new plants were projected far removed from the center of the industry, in the Naugatuck Valley of Connecticut, and every possible shift was made. Fortunately the end of the war came before the effects of lagging production became acute. In wire, too, the situation was becoming critical, following the call of the Signal Corps in September for 1,500,000 pounds of wire for field telephones.

It has since developed that in this as in many other fields of war supplies the calculated requirements were greater than the actual needs; and while this belated knowledge is comforting in speculating on what might have happened had the war continued, it does not in any way modify the gravity of the tasks that were assigned to the brass section and to the copper and brass working industries.

Zinc figures as a war material, chiefly through its use in union with copper in the making of brass and allied

alloys and for galvanizing steel. In its crude form — spelter — there was never any shortage of it during the war for military purposes, though there was a considerable diversion of this metal from certain peace-time uses and it was important as a substitute for steel in some uses. The United States produces thirty-one per cent of the zinc of the world, and there was no problem of importations to deal with. Neither was price a vexatious matter, as it was with many other metals.

The main problem of zinc regulation was to secure a sufficient quantity of the higher grades, demanded by the army and the navy in the manufacture of small-arm ammunition shells. This was solved by putting a stimulative maximum price of twelve cents a pound on Grade A spelter. It was not felt that there was any need of a minimum price in order to stimulate production. The zinc industry was not highly organized. Although there was at one time a zinc committee in the Raw Materials Division of the Advisory Commission of the Council of National Defense, it was dissolved when the market price of zinc fell below the level of prices it was intended to secure by agreement.

Throughout the war Government purchases were made directly by negotiation or by competitive bids. After the maximum base price for sheet and lead had been established, the mines of the Joplin field, which could not continue at the prices they had been receiving, proposed to the zinc rolling mills that the latter should increase their price from about \$50 to about \$75 a ton based on sixty per cent zinc concentrates and a certain maximum of lead content, and distribute their requirements proportionately among all the mines. This proposal was favorably received and the mine owners formed an association, a committee of which was authorized by the Non-Ferrous Metals Section to receive the pooled requirements of the rolling mills and allocate them among the mines. The American Zinc Institute was formed in July, 1918, for the purpose of promoting the interests of the whole industry, but it was not a war service organization.

The sole producer of aluminum metal in the United States

and Canada is the Aluminum Company of America; consequently Arthur Davis, the president of that company, could speak and act for the whole industry in dealing with the War Industries Board. He virtually placed the industry at the disposition of the Government and acted at all times on the highest plane of service and patriotism. On April 25, 1917, he offered to the Government, through Mr. Baruch, all the aluminum it might require at that time at its own price, despite the fact that the outside price was 60 cents. Two million pounds were immediately accepted at 27½ cents, and later six million pounds were added, delivery to be made before August. In September, Mr. Davis agreed with the War Industries Board through Mr. Meyer to fill all war industry requirements, direct or indirect, at the current 38-cent base price and to refund the difference should the Government later name a lower price. Owing to the shortage that began to develop at a later period, the Federal Trade Commission was asked to investigate the costs of aluminum manufacture. With the Commission's report before it, the Price-Fixing Committee in agreement with the Aluminum Company fixed the base price at 32 cents for aluminum ingots in fifty-ton lots, f.o.b. the producing plants. This price prevailed until June 1, 1918, when it was raised one cent, and the price remained at 33 cents until it expired by agreement March 1, 1919.

There is a considerable quantity of aluminum brought to the market each year through the resmelting of scrap aluminum, but no particular difficulty was encountered in dealing with this secondary product.

With the United States in the war, the demand for aluminum for military purposes rose to ninety per cent of the production, and control of distribution was necessary. This was effected by the application of priority principles, the Aluminum Company being allowed considerable latitude of judgment in determining the relative priority of the orders, which consumers were authorized to place with it directly. When the Company was doubtful of the validity of its own judgment in this matter, it referred the question to the Non-Ferrous Metals Section. Secondary or resmelted aluminum was also purchased by consumers

directly from the smelters, but only on the approval of priority applications by the section.

In the first part of the war the European demand for aluminum was chiefly for use in the form of dust to make an explosive in combination with ammonium nitrate. Other military uses of aluminum were found in the manufacture of mess, personal, and horse equipment, drop bombs, fuses, flares, fillers, hand grenades, heavy ammunition, rifle cartridges, and for airplanes, aeronautical engines, castings, and all kinds of engines. In normal times the chief industries using aluminum are the automotive industry, which consumes 15,500 tons; the steel industry, which uses 5000 tons as a deoxidizing agent; and the manufacture of utensils, which takes 12,000 tons.

During 1918 the production of primary aluminum in the United States fell from the 100,000 tons of 1917 to 67,000 tons, because of a shortage of water power during the winter, and the situation became somewhat delicate. The Aluminum Company undertook to enlarge its capacity, but this was not accomplished before the end of the war.

The control of aluminum was the perfect model of the War Industries Board's principle of concentration, because, outside of the secondary metal producers, the industry was in the hands of a single well-intentioned man, and did not necessitate even the friction that arises in a small committee. Even when it developed that the French importers were making a profit on aluminum obtained through the War Industries Board at the Government price, Mr. Davis, though protesting and asking for a rectification of this injustice, was never obstructive.

Antimony is a metal that is produced within the United States only in negligible quantities. The bulk of American requirements are supplied by China. There are large deposits of antimonial ores in France — so the United States had only its own ordinary and military requirements to deal with. Nevertheless, the long trans-Pacific voyage gave rise to some concern regarding supplies, and at times there was a little touch of panic and a tendency to take what was offered at any price. In the peaceful industries, antimony is used in such alloys as Britannia metal, pewter, Babbitt

and other bearing metals, type metal and antimonial lead. Its oxide and sulphide are used in pigments, glassware, metal ware enamel, vulcanized rubber, and some other products. The chief military use of antimony during the recent war was for hardening the lead of shrapnel bullets. About seventy per cent of the available supply was needed for this purpose.

In the spring of 1917 there were only 200 tons of antimony in the bonded warehouses, and when it got abroad that the ordnance people wanted 3000 tons for immediate delivery, the price jumped from around 14 cents to 19½ and 20 cents a pound. Mr. Meyer then took up the matter and found that 3000 tons could not be used for a long time. He accordingly arranged for buying in one-hundred-ton lots, with the result that the price gradually settled back to where it had been.

By the end of 1917 the stocks in bonded warehouses were 5201 tons. In these circumstances, little or no control was required — only prudence in buying. In fact, there was no control, except that the War Trade Board put an embargo on exports. Needed supplies of the metal were bought from time to time on bids requested by the Non-Ferrous Metals Section at the instance of the Ordnance Department. The total requirements of the army, navy and Emergency Fleet Corporation averaged about 750 tons a month, and during 1918 the prices varied from 11.09 to 14 cents a pound.

The only manipulation of importance in insuring an adequate supply of antimony was an arrangement made through the Treasury Department with the Wah Chang Company, importers from China, to let it have a certain amount of silver. There was an embargo on the export of silver from this country to China, which made antimony trading and exporting difficult. In this way the Government obtained a sort of grasp on exports of antimony from China, which made extortion impossible. As a precautionary measure some effort was made to stimulate the domestic production of antimony, and it was included in the War Minerals Act of Congress.¹

¹See Chapter XX.

Lead was another of the sinews of war in which no real shortage ever developed, though Government dealings with the lead producers are a good example of the manner in which the War Industries Board prevented the artificial manipulation of prices when the relations of supply and demand were not normally productive of high prices. The Board never used a sledgehammer to kill a gnat; its weapons of priority, formal price-fixing, and commandeering never being used or even exhibited except where shortages due to emergency demands put the Government in the position of being the booster of the prices of its requirements. In general, the lead industry was simply informed that no manipulation would be tolerated.

In line with his policy of securing initial raw material prices that would set an example and determine the later state of mind of the trade, Mr. Baruch, when dealing in the first days of the war with all raw materials personally, with only the aid of two or three executive assistants, obtained, through his Advisory Commission lead producers' committee, a price of 8 cents a pound for Government orders aggregating 83,000 tons. At that time the New York price was about 11 cents a pound, as against 6.8 cents in the preceding September. In this manner a tendency toward a runaway price was definitely checked. When the appointed lead producers' committee resigned in November, 1917, after the War Industries Board had decided on a sharp line of demarcation between trade committees and authorized representatives of the Council of National Defense, there was one directly negotiated purchase of lead, amounting to 5000 tons, at 5.425 cents a pound, St. Louis. However, it should be added that when the market price fell below 8 cents in October, the producers made good their early coöperative intention by voluntarily supplying the remainder of the 83,000-ton commitment at the market price.

With the exception of the 5000 tons noted, all purchases after the original undertaking were made at the St. Louis market price, as recorded by the "Engineering and Mining Journal." Whenever a tendency developed unduly to control the market, the producers were mildly reminded that, while the Government had no desire to control this industry,

it was incumbent upon them to maintain a price that would be fair to the Government and just high enough to bring out the needed volume of production. As a result the Price-Fixing Committee never had to interfere, and the price did not rise above 7.75 cents.

There were signs of a shortage in August, 1918, due to labor troubles, hot weather, and the Government programme of building up a reserve to guard against transportation deficiencies. On investigation it was found that there was nothing alarming in the situation and that some of the producers had excessively large stocks. Still, it was considered the part of discretion to limit stocks to thirty-days requirements and arrange with the Lead Producers' War Service Committee (organized in June, 1918, with Clinton H. Crane as chairman) to distribute supplies under the supervision of the Non-Ferrous Section.

Owing to the particular shortage of sheet lead, J. R. Wettstein was appointed to pass on the relative importance of manufacturers' orders. An embargo was placed on the exportation of domestic lead, and the allocation of importations was also turned over to the committee. No applications for priority were required, though there was some conservation with the assistance of the Conservation Division. Lead for birdshot was curtailed, and tobacco manufacturers were restricted to 25,000 tons per annum for leadfoil which they had begun to use as a substitute for tinfoil. The use of lead in building was reduced somewhat, and zinc was substituted for lead in coffin linings and in the making of pigments. During the interval between the resignation of the original Council committee and the appointment of a war service committee by the industry, Irwin H. Cornell, acting for the producers, allocated requirements under the supervision of the section.

The handling of lead prices and production throughout the war is an admirable illustration of how an industry, in the hands of a comparatively few proprietors and managers, can be administered without profiteering and without direct control when animated by a spirit of fair-dealing, and dealt with on the part of Government by business men devoid of the persecuting motive on the one hand or of the promptings of selfishness on the other.

Nickel, like aluminum, is a monopolized metal, so far as American production is concerned. The International Nickel Company, a United States corporation, produces all of the nickel made in the United States, but the ore or the matte comes almost entirely from Canada, that country and New Caledonia, a French island in the South Pacific, having about the only important nickel deposits in the world. A little nickel originates in the United States as a by-product of the electrolytic refining of copper. As nickel is a monopoly and the holder of the monopoly was disposed to fair dealing, no formal control was required, and only such regulation of distribution as would insure the war needs of the Government and of the Allies.

The qualities of nickel which make it important in industry are its resistance to corrosion and its contribution of tensile strength to steel with which it is alloyed. Nickel steel is used in rails, armor plate, bridge steel, castings, ordnance of all sorts, engine forgings and shafting (especially in automobiles and railroad cars). Monel metal is a nickel-copper-iron-cobalt alloy made directly from nickel ore which is largely used in warships. The total supply of nickel was not much more than war requirements. After our entry into the war, stocks were always at a low ebb, falling to only 267 tons in July, 1918. However, the only serious shortage was that of electrolytic nickel, used for rotating and driving-bands for shells and for bullet jackets, in the spring of 1918. This situation was met by using a percentage of shot nickel with the electrolytic.

Conservation was effected by restricting the unnecessary uses of nickel and even by refusing its exportation to foreign governments for coinage purposes. Prices were never controlled, the Price-Fixing Committee merely entering into an agreement with the Nickel Company which confirmed the price the Company had been making. Since 1910, the ingot price fixed by the Company had ranged from 30 to 40 cents, the latter being the 1917 price. The Company offered to supply American and Allied requirements at 35 cents a pound for ingot nickel, 38 cents for shot nickel, and 40 cents for electrolytic, and this offer was accepted. Corresponding prices were made for monel metal for the navy. No price

for the public was made, as Government requirements, direct or indirect, about filled the market. The consumers on Government account made their purchases directly from the Company without priority applications, except in a few instances; the Company controlling distribution according to the wishes of the section, and determining priority of delivery according to its own judgment.

Quicksilver is a metal of limited production and corresponding demand in ordinary times. The extraordinary demands of war increased American consumption about fifty per cent, the increase being met almost wholly by increased domestic production, the imports remaining about the same as before the war. The problem of obtaining an adequate domestic supply was almost wholly one of price, as many mines are shut down at low prices; the number in operation varying from twenty-four to sixty-six. Spain has the richest and most cheaply worked mines, and, aside from a little recovered mercury that comes from Mexico, contributes a varying percentage of the American consumption.

As it was desirable to encourage domestic production, there was not much haggling about the price, especially as the total amount involved was small. The total of military contracts during 1917 was 11,327 flasks, but the forecast for 1919 was 33,000 flasks — about equal to the entire domestic production. The chief military use of mercury is in the manufacture of mercury fulminates for ammunition. The navy and the Emergency Fleet needed it for anti-corrosive paints, and other uses were for medicinal purposes, for the “dope” of airplane surfaces, electrical apparatus, felt manufacture, gold and silver milling, and certain industrial and scientific instruments. Practically no substitutes for mercury were developed, and the only conservation was through economy and an embargo on all exports except a small amount for the Canadian Government.

Because of the narrow margin between possible supply and demand, and the tendency of prices to advance unduly, quicksilver was taken under control early in 1918, but the Price-Fixing Committee did not act. Prices had been as high as \$123.20 a flask, but at a conference between Mr. Yeatman and the producers on April 4, 1918, they agreed to

deliver to the Government at \$105 a hundred-pound flask at Mare Island Navy Yard, California, and \$105.75, Brooklyn Navy Yard. On account of the precarious nature of the business, it was not considered wise to demand the same price for the public, but the producers were informally urged not to let the price to the public get above \$125 to \$130. As for the importers, they agreed to give the Government forty per cent of their importations at approximately the same prices as the domestic producers. All Government demands except the Medical Corps of the army and the Emergency Fleet Corporation were by agreement handled through the navy and the Non-Ferrous Section; the two exceptions buying in the market. No control was attempted over the material not required by the Government, except the informal price limitation.

However, the size of the Government requirements for 1919 indicated the necessity of extraordinary measures. Steps were taken to increase importations and the Price-Fixing Committee had called a conference on the subject of quicksilver, but the ending of the war intervened.

The whole handling of the metals that came within the province of the Non-Ferrous Metals Section was a high type of the characteristic War Industries Board policy of sagacious expediency. Each metal was dealt with according to its peculiar relation to the general situation caused by the war. There was no standard form of regulation, and none whatever merely for the sake of regulation.

CHAPTER XX

PLATINUM AND TIN

I. Smuggling platinum from Bolshevik Russia—Bartering with the British for tin.

II. Where the world's tin is—Tin and the "ring merchants" of London—Driving down the price and saving millions—Tin cans and the economics of war—Tin for bombs, fuses, and flares—A moral to be drawn.

III. Platinum the indispensable—Twenty thousand ounces under ambassadorial seal—Requisitioning platinum, iridium, and palladium.

I

THE metallic elements of the *matériel* of war hitherto considered are produced in the United States in sufficient quantities, with the exception of antimony, to make the Nation self-contained in the emergency of exclusion from foreign sources. And in a pinch, and at a high cost, we probably could produce from known domestic ores enough antimony to tide us over. It is true that only a negligible amount of nickel is found in the United States, but in the recent war it could be considered as a domestic product, not only because Canada, the chief source of nickel, was a neighbor and an ally, but because an American company is the chief miner of the Canadian ores, and because part of the smelting and virtually all of the refining is, or was, carried on on the American side.

Two important metallic factors in industrial support of military effort are virtually entirely lacking in the realms of the Republic, namely, platinum and tin. Russia normally supplies from eighty to ninety per cent of the world's platinum, and most of the rest comes from Colombia. Tin production is largely within the boundaries of the British Empire. Thus, at the beginning of the war the sources of these indispensable metals were in the hands of our friends. The Russian revolution eventually resulted in the withdrawal of that country from the war, and the Peace of Brest-Litovsk placed Russia in the Teutonic column in an

industrial sense to the extent that the Bolshevik régime did not dissolve Russia as an industrial factor.

After that untoward event the getting of platinum from Russia was a matter of intrigue and stratagem, conspiracy and adventure; and the meeting of war demands became one of manipulation, adaptation, and conservation at home, smuggling in Russia, and finance, exploration, and diplomacy in Colombia. In the case of the latter country there was even some effort to pivot the settlement of the Panama grievance and the confirmation of the Colombia Treaty, with its \$25,000,000 for Colombia, on the Colombia protection of platinum.

With tin the problem was one between friends, involving careful handling to enforce the American policy of reciprocity of materials among the Allies, which held that, as between Government requirements, at least, there must be an equality of prices and equitable allocation. It was an international contact of many phases.

II

Although producing no tin ore, except less than one per cent of its tin requirements, the United States¹ is the greatest consumer and the greatest manufacturer of tin products, using more than half the entire tin output of the world. The British Empire controls about sixty per cent of the pig tin of the world, and the mining sources of the pig tin are in the Dutch East Indies, the Federated Malay States, China, Cornwall in England itself, Wales, Portugal, Nigeria, Bolivia, South Africa, and Australia. The Malay States alone produce about half of the world's tin ore, and the chief portion of the world's smelting of the ore into tin is at Penang and Singapore in the Straits Settlements.

The American imports of tin are in the form of pig from all of the above-named countries except Bolivia, which ships concentrates to the American Smelting and Refining Company, at Perth Amboy, New Jersey. Although this domestic smelting did not begin until 1916, it produced more than eight thousand tons in 1918,² while the imports were about

¹Alaska yields about one hundred tons of tin annually.

²The Williams Harvey Corporation built a smelter at Jamaica Bay in 1918.

ten times as great. The foreign tin supply was largely in the hands of the so-called "ring merchants" in London. In further complication of the situation the British Government insisted that all importations of British tin into the United States must be viséed and the bills of lading checked by the British consul at the port of entry. After this restriction was withdrawn and importations were put into the hands of the Pig Tin Committee of the American Iron and Steel Institute, further entanglements resulted from the refusal of the British authorities to give export licenses for shipment to American consumers who had not been importers theretofore. The next difficulty was in the scarcity of "Straits tin," which resulted in orders for Dutch East Indies tin. With four thousand tons of this tin undelivered, the Dutch tied up their ships, and there arose a shortage scare.

As a result of these impediments and the manipulations of the London "ring," Straits tin sold as high as \$1.38 a pound in New York in May, 1918, as compared with 31 cents in August, 1914. In consequence of the effectuation of the International Tin Executive in London in August, following negotiations begun in Washington with the British Embassy and Chandler P. Anderson, George Armsby, and Professor Lincoln Hutchinson in May, the price of pig tin at its various sources was reduced from a maximum of £443 a ton to £250, and would have been put down to £200. In consequence the price of spot tin in the United States went down to 71.5 cents a pound. On a year's importations this bit of inter-Allied diplomacy resulted in a saving of \$62,000,000 to \$75,000,000.

Another result of the Tin Executive was to take the handling of the imports out of the hands of foreigners. The United States Steel Products Company, acting for the Pig Tin Committee of the American Iron and Steel Institute, bought all the tin allocated to the United States, which, by virtue of the coöperation of the War Trade Board, was the only licensed importer, and the Tin Committee attended to allocation and distribution. Private importations of tin ore, concentrates, and tin chemicals were permitted subject to the approval of the Tin Committee, and even imported tin alloys, containing more than twenty per cent of tin, were put

under control. The Tin Executive allocated 80,000 tons of tin to the United States as against 52,500 tons to the Allies.

The tin control, it will be seen, did not involve activity by the Price-Fixing Committee, nor the application of priority in the ordinary sense. There was, of course, no committee of tin producers, but there were several trade committees of tin-users, through which the Tin Section maintained its contacts with consumption. This section was not created until March, 1918. Grafton D. Dorsey, of New York, was the first chief, but was compelled to retire on account of ill-health, and was succeeded by George Armsby, of San Francisco.

Aside from the primary work of bringing about international control of pig tin, the work of the section was largely concentrated on economy, conservation, and substitution. Considerable attention was given to the recovery of tin from scrap. As tin is used in some form or degree by almost every manufacturing establishment in the country, conservation covered a very wide field. The chief use of tin is in the manufacture of tinplate as a protective cover for the iron or steel sheet. It was in the form of tinplate that tin chiefly entered into the economics of war, the former being indispensable in providing containers of foods, of which enormous numbers were required in alimentering our armies, civil population, and the Allies, as well as the neutrals to some extent.

Conservation was mostly aimed at withdrawing as much tin as possible from other uses in order to provide sufficient for the tinplate industry. Even at that, the amount of steel allowed to each plate mill was reduced thirty per cent. Altogether the production of tinplate was maintained at a satisfactory rate; of the twenty-two tinplate plants the output in September, 1918, being 2,892,000 base boxes (a base box weighs 100 pounds). By November it was possible to authorize the production of 1,200,000 boxes for the oil industry and 125,000 for the bottle-stopper trade. Besides meeting all necessary American requirements, 55,887 gross tons of tinplate were spared to the Allies during 1918.

Tin is used in large quantities in solder, in Babbitt and other bearing metals, in the manufacture of brass and

bronze, in the manufacture of glass and rubber, in whitening enamel, and (in the tetrachloride form) as a mordant in the dyeing of silk and to give weight to the fabric. Besides its ordinary industrial uses, tin was especially required during the war for bombs, fuses, flares, and pyrotechnic explosives of all sorts, both as a producer of glaring effects, and of concealing-smoke. The conservation programme involved the curtailment of the use of tin in tinfoil and collapsible tubes, in reductions of the proportion of tin in Babbitts, alloy castings, and solder. The actual decline in tin consumption in 1918 was 9300 long tons, and the full application of conservation for a twelvemonth would have resulted in a saving of 13,000 long tons, or fifteen per cent of the estimated requirements of tin for 1918.

The administration of tin involved the closest coöperation between the War Industries Board, the War Trade Board, and the Food Administration, to say nothing of the basic international coöperation and the team-work with and between the tin-using industries. In review, it now appears that there was never any real danger of an absolute shortage for restricted uses, notwithstanding the reduced production of tin in 1918, but it is equally true that, without international control and centralized control within the United States, the price would have been appallingly high and the distribution of supplies so unequal that industry would have suffered severely.

The handling of tin affords, perhaps, the best example of the international application of the War Industries Board's conception of the integration of industries and the pooling of their products under joint industrial and Government control. America not being a tin-producing country, the Board reached out and pooled the tin of all the world, got an equitable share for the United States, and then measured it out prudently and carefully for the best interests of the military programme and the public. All of this was accomplished without the use of a cent of Government capital, the funds being provided in the first instance by the United States Steel Products Company. The war abounded in similar deeds of service by our business men and corporations that are little known. News, unfortunately,

is compounded of the sensational in crime rather than of excellence in well-doing. To swindle the Government is to get on the first page; to save it hundreds of millions is more likely to achieve oblivion. The fault lies in human nature rather than in the press. The world loves to hear of the evils it abhors, but cares less for knowledge of honor it demands.

III

Platinum is a metal that gratifies human vanity, and at the same time is one of the most indispensable of the metallic industrial agents. As its cost soared with scarcity in war-time, it arose simultaneously in demand for the manufacture of jewelry and for the enginery of war. The white fingers of women vied with the stinking vats of acid manufacture for its possession. The more the war demand drove up the price and gold sank relatively to plebeian levels of price, the more the favor for platinum jewelry.

To the lay mind platinum is a metal of mystery and almost of necromancy in that its presence, but not its consumption, is required in the contact process of making concentrated sulphuric acid. The immense volume of this acid required in the manufacture of munitions as well as for ordinary industrial purposes gives platinum a unique economic importance. The next most important requirement for it during the war was in the erection and equipment of the nitrogen-fixation plants, which were designed to render us independent of Chilean nitrates both for munitions and industrial uses.

The qualities of high fusibility, malleability, electrical conductivity, and chemical inactivity in platinum are unequaled, and as yet no adequate substitutes have been found for its most important uses. Alloyed with iridium, it is used in the contact points of ignition apparatus of all forms of internal combustion engines, and hence it is essential to the manufacture of airplanes and all sorts of automotive vehicles. It cannot be dispensed with in the making of heavy guns because its wire is the only known wire that can withstand the intense heat in the thermometer which is used in maintaining for definite periods the uniform

high degree of heat, the least departure from which will make the gun useless. It is used in ignition fuses, and in the chemical and physical laboratories it was of the greatest importance in the research work the war demanded, especially in connection with the use of gases and their neutralization. It is indispensable in the manufacture of ship compasses, chronometers, and many other instruments of precision. Surgery also makes its demands on platinum for surgical instruments and such apparatus as X-ray tubes, cautery tips, and hypodermic needles, and dentistry demands a considerable quantity.

When the United States entered the war, it was confronted by a very limited supply brought about by the increased requirements of war since 1914 and the steady decline of platinum production in Russia as that country went steadily from worse to worst economically. In 1913, Russia produced 250,000 ounces and all the rest of the world only 17,233. By 1917, the Russian output was down to 50,000 ounces, and, though the Colombia output had been brought up from 15,000 to 32,000 ounces, all the rest of the world produced only 685 ounces in the latter year, of which the United States' contribution was only 605 ounces. There is, however, a considerable amount of platinum refining in the United States, the crude platinum coming chiefly from Colombia. In addition, the recovery of secondary platinum from sweepings and the reduction of articles that have gone into the scrap-heap makes a considerable addition to the domestic supply, which under the pressure of war necessity went up from 40,698 Troy ounces in 1914 to between 60,000 and 70,000 ounces in 1918. As demand increased and supply decreased, prices ascended from around \$39 an ounce in 1915 to \$108 in 1917. It is to be noted that Mr. Baruch, as early as December, 1916, asked Secretary McAdoo to place an embargo on all platinum received at United States Mints, thus clearly foreseeing the impending scarcity and demand.

The apprehension caused by the extreme shortage was relieved for a time in December of that year by the arrival from Russia of F. W. Draper, an American engineer, carrying with him 20,000 ounces of crude platinum, which was

turned over to the Government for technical uses. Mr. Draper had got this platinum together in Russia with the aid of other American engineers, the Russian-English Bank of Petrograd, the United States Department of Commerce; and was assisted in his hazardous journey across Russia by the American embassy to Russia, the metal being carried under the ambassadorial seal.

An element of business as well as personal adventure entered into this enterprise. Mr. Draper felt that he and his associates were well entitled to the American price of \$105, considering the risks they had run, the hardships endured, and the relief they had occasioned. In this view he had the sympathy of the Bureau of Mines, of the Department of the Interior, which was coöperating with the War Industries Board in the handling of the platinum problem. The War Industries Board was of a different view, recalling that it was due to the foresight of Mr. L. L. Summers, then associated with Mr. Baruch as technical adviser and later to become a member of the Board, that the Draper enterprise was undertaken, and that it could never have succeeded without governmental assistance.

There was a line of cleavage between the Bureau of Mines and the War Industries Board all the way through on the platinum problem. The Board was not so "jumpy" on the subject as the Bureau, which was inclined to take a gloomy view of the platinum prospect on the assumption that the war might continue for several years, and did not proceed precipitately in conservation and requisition measures. The Board, while recognizing the situation as serious and taking measures to build up a reserve, felt that in the last resort the platinum in private hands, chiefly in the form of jewelry, would be ample to meet any future deficit. The difference between the two bodies is the difference that frequently arises between men with the scientific outlook and those with practical experience.

The scientific men were deeply impressed with one phase of the platinum problem, that the practical men had not at first thought much about. Iridium and palladium are two precious and important metals that are found in association with platinum. Iridium was of military importance because

of its use in connection with platinum for sparking points and magnetos; and palladium was useful in that it could replace platinum in dentistry to a considerable extent.

In a report on the platinum situation, made at the beginning of 1918 by Dr. James M. Hill, of the Geological Survey, it was held that, while the outlook indicated that the platinum stores were sufficient to carry through 1918, there would be a deficit of about 1200 ounces of iridium and 11,000 of palladium. The palladium deficit was not a serious thing, but that of iridium was, and the Hill report emphasized the fact that there was no way to meet it except to procure 25,000 ounces of crude platinum which would carry with it sufficient iridium. "I cannot state too strongly the extremely serious situation in which we find ourselves," said Dr. Hill, "and urge that all possible steps be taken at once to do what can be done to rectify the mistake made early in the summer in not buying crude platinum."

Dr. Hill was also much disturbed by the fact that two of the four platinum refining concerns in the United States were controlled by a man of German birth and most intimate German business associations who was reputed to be in control of the largest platinum refining plant in Germany. "His loyalty to the United States," the Hill report continued, "is open to question, and it hardly seems wise to trust platinum refining to such a one, when it is realized that slight impurities in platinum for sulphuric acid plants render the catalyst valueless, or that more than 0.5 per cent of impurities in iridium for electrical alloys render the alloy ineffective." Here were the makings of a portentous industrial ambush. Dr. Hill recommended that to remedy the situation the Government should immediately dispatch agents to Russia and Colombia to procure all possible platinum and that all refining and fabrication should be done under Government supervision. He also urged the immediate requisitioning of all platinum metals in the hands of refiners and jewelers.

In accordance with these recommendations, the Platinum Section, which was organized in March with C. H. Connor in charge, began immediately to take steps to cope with the situation. One of its first discoveries was that requirements

would be larger than Dr. Hill had calculated, making the position proportionately more precarious. A requisition order addressed to fourteen holders of platinum had been issued in February, but on May 1st a new order was addressed to 947 dealers in or users of platinum, iridium, and palladium. The two orders brought to the section control of 59,690 ounces of platinum. A later order applied to 1555 persons or companies. To make control more imperative, Congress amended the act creating the Bureau of Mines and gave the Bureau statutory authority to establish a licensing system, whereby the sale, possession, and use of the platinum group of metals would be authorized. It was thought the new law would involve more than 150,000 licenses. The War Industries Board was to administer the law in conjunction with the Bureau in order to avoid confusion. The signing of the armistice interrupted the licensing work before it had made much of a start.

Special efforts were made to increase the production of platinum in Colombia and importations therefrom. These included steps to facilitate the financing of mining and trading, and even contemplated efforts to secure the ratification of the long-pending treaty with Colombia concerning the Panama Canal as an offset to Colombian coldness and disposition to exercise control over platinum as a reprisal. It developed that speculators were holding back a part of the Colombia production.

Through appeals made by the Red Cross, patriotic citizens contributed platinum articles containing several thousand ounces of platinum. As early as August, 1917, the exportation of platinum was virtually prohibited; but modifications permitted the exportation of platinum-containing articles if the exporters undertook to import a corresponding amount of metal. In this way the platinum stocks of other countries were drawn upon for replacement purposes. Eventually the use of platinum in the manufacture of jewelry was wholly forbidden, but because of the expense involved no effort was made to requisition existing jewelry; but the prohibition of its exportation kept it in the country if desperate need should arise. Platinum for industrial uses was con-

trolled, and it was denied for pleasure cars, electric bells, electric advertising signs, clocks, photographic paper, electrical specialties, and many other purposes.

It was found possible to exclude platinum from X-ray apparatus and to reduce its use in dentistry by seventy-five per cent (a saving of 22,550 ounces). Extensive conservation was effected by minimum use and substitution, many phases of the latter being brilliantly successful. All the great industrial consumers of platinum studied substitution, among them being the Ohio Salt Company, the North American Chemical Company, the National Electrolytic Company, and the Western Electric Company. The systematic collection of scrap had hardly started before the war ended, but it had promising possibilities. But in July, August, and September, the policy of encouraging consumers of platinum to turn in scrap in return for new platinum resulted in the reception of platinum scrap amounting to fifty per cent of the withdrawals of the metal. It was planned to stimulate domestic production wherever possible, and many mining prospects were investigated. The War Minerals Stimulation Law¹ was not approved, however, until October 5, 1918, and in the interval before the armistice no enterprise was found that was deemed worthy of assistance.

Few of the war materials developed such surprising fluctuations in requirements and so much resourcefulness and enterprise in meeting them. In July, 1917, not a single

¹This act placed \$50,000,000 at the disposal of the President for use, virtually at his discretion, in stimulating the production of minerals of which the war had revealed a shortage or an alarming scarcity. There was some rivalry between the War Industries Board and the Department of the Interior for choice as the executive agent, the latter feeling that, on account of the intimacy of the two great bureaus, the Bureau of Mines and the Geological Survey, with the subject-matter of the act, the administration properly belonged to it. On the other hand, the War Industries Board was fundamentally the Government agency dealing with the practical use of such materials. At the suggestion of Mr. Baruch, the administration of the act was allotted to the Bureau of Mines, but the War Industries Board was authorized to determine needs and call upon the Bureau to apply the act to meet them. The termination of the war nullified the act, which otherwise might have been of great permanent as well as of emergency benefit. The minerals named in the act were antimony, arsenic, asbestos, bismuth, bromine, cerium, chalk, chromite, chromium, cobalt, corundum, emery, fluorspar, ferro-silicon, fuller's earth, graphite, grinding pebbles, iridium, kaolin, magnesite, manganese, mercury, mica, molybdenum, osmium, sodium nitrate, palladium, paper clay, phosphorus, platinum, potassium, pyrites, radium, sulphur, tin, titanium, tungsten, uranium, vanadium, and zirconium.

Government department reported any need of platinum, but nine months later their requirements were put at 37,000 ounces for 1918, and, four months later still, they jumped to 70,000 ounces. At the same time the essential industries were consuming 3000 ounces a month. Then for 1919 it was figured that conservation and substitution would hold Government requirements down to 33,000 ounces of platinum and 1159 ounces of iridium.

The creation of the International Platinum Executive, which was about ready for announcement at the end of the war, would doubtless have been of great assistance in meeting any unforeseen crisis that might have arisen had the struggle continued.

CHAPTER XXI

FERRO-ALLOYS AND WAR MINERALS

The steel industry jeopardized — Manganese and the lost collier *Cyclops* — Sailing vessels bring chrome metal from Rhodesia — Basic policies of raw materials procurement — Their operation vital to national defense — Tungsten and vanadium — Henry Ford, Baruch, and zirconium — Other precious minerals.

ON May 17, 1918, President Farrell, of the United States Steel Corporation, speaking in his capacity as a member of the Iron and Steel Institute's war service committee, warned the War Industries Board that the entire steel industry of America would be shut down by the following December unless manganese ore could be procured from Brazil. The statement laconically revealed the military dependence of the United States, with all its mineral wealth, on foreign sources for an essential of the production of the fundamental metal of warfare.

Manganese was only one of the war minerals, as were designated ores and minerals which the United States drew impartially from foreign sources. The War Minerals Act list, printed elsewhere, names forty, but the chief of them, considered in the light of pressing war demands, were sodium nitrate, potash, pyrite, manganese, tin, graphite, asbestos, mercury, tungsten, vanadium, molybdenum, zirconium, chromite, magnesite, mica, platinum, iridium, and antimony.

Nickel is a war mineral in which the United States is primarily dependent upon Canada, but, as already pointed out, the political, transport, and proprietary factors relating to it made it virtually a domestic metal of adequate volume during the recent war. Mercury, platinum, tin, iridium, and antimony have been considered in preceding chapters, and nitrate will be the subject of the following chapter.¹

Of the war minerals already dealt with, all but tin, which was in a section by itself in Mr. Legge's administrative

¹The more important war minerals not discussed in this chapter are more properly dealt with in Chapter XXIII, relating to chemicals.

division, were in the Non-Ferrous Metals Section of the same division. The remainder of the war minerals were assigned to the Chemical Division, in Mr. Summers's department of the Board, and were under the general direction of Mr. C. H. McDowell.

Mr. Farrell did not overstate the position in his above-reported statement regarding manganese. Some form of manganese is indispensable in the manufacture of steel of almost every sort. It is commonly used in the form of iron-manganese alloys, spiegeleisen, and ferromanganese as a purifying agent.

There are considerable deposits of manganese ore in the United States, notably in Minnesota, Montana, California, Arizona, Nevada, Virginia, Georgia, Tennessee, and Arkansas, but, as compared with the foreign ores, they are lean, hard to work, and costly of mining and transportation. Before the war the production of manganese ores in the United States was, therefore, negligible. But the military importance of self-containment and the scarcity of shipping made it important to produce as much ore at home as possible. It was chiefly with manganese and other ferro-alloy minerals in mind that Congress, at the instance of the late Secretary of the Interior Lane, appropriated \$150,000 in March, 1918, to continue and extend the investigation of domestic war materials, and later appropriated \$50,000,000 to promote their production.

Most of the imported manganese came from Brazil, and the long haul absorbed a great deal of shipping that could be used more economically elsewhere. Domestic production was automatically stimulated by the high prices, which were left to themselves for that very purpose, but, with all the gratifying expansion of such production that followed, it was still necessary to foster Brazilian and other foreign manganese mining. It was even necessary to divert precious shipping to the carrying of coal to Brazil for the use of the railways there hauling the ore to the seaboard. The reduction in the required standard of purity of steel extended the availability of American ores, and every effort was made to stimulate their production. But all of this required time, and at the height of the crisis the naval

collier *Cyclops*, with a cargo of manganese, was lost at sea, and 12,000 tons had to be imported from England.

The price of high-grade ferromanganese, which was \$37.50 a ton in 1914, went as high as \$400 in the summer of 1917, but was unofficially stabilized through the efforts of the American Iron and Steel Institute at \$250 a ton. Connected with the increased production of domestic ores was the problem of their reduction to the alloy form, which necessitated a considerable extension of furnaces suitable to that purpose. Both problems were successfully met. From a domestic production of ore, amounting to only 27,000 tons in 1916, the output soared to about 1,500,000 tons in 1918, though much of it was so low in manganese content that it was necessary to import 520,000 tons in the same year.

The programme for 1919 contemplated the restriction of Brazilian imports to 250,000 tons, for it was then plain that in a last resort the United States could take care of all its manganese requirements with domestic ores. There was no conservation or price-fixing required in the manganese administration, the task simply being one of stimulating and facilitating production by lifting railroad transportation embargoes, getting priorities for mining machinery, the building of side-tracks, the obtaining of food and machinery supplies for the Cuban mines and of coal for Brazil, and of attending to innumerable details incident to a mining revival that covered the continent and involved scores of mines.

Chromium or chrome metal is virtually indispensable in the making of armor plate, projectiles, high-speed tool-steels, motor vehicles, and airplanes. It is derived from chromite, a mineral ore, which was also used directly for bricks and cement for metallurgical furnace linings. Chrome salts are widely used in leather tanning solutions and pigments and as a mordant in the textile industries. As the ordinary sources are chiefly in Rhodesia and New Caledonia, importation under war-time shipping conditions was a grave problem. Steam vessels were not available, and recourse was had to sailing vessels. At the same time every effort was made to stimulate the domestic production of chromium, chiefly in Oregon and California.

The rise in price from around \$12 to \$60 and \$80 a ton lured prospectors and miners to the chromite deposits before we entered the war. The American production was only 255 tons in 1913; in 1917, it was 43,000 tons; and in 1918, 60,000 tons, as against total requirements of 90,000 tons.

The imports for the year were 90,000 tons. The end of the war, therefore, found an excess of high-priced material on hand. This development was brought about, not only by the attraction of the high price which sent the prospectors into the hills and mountains and gave them a claim on the resources of speculators and capitalists, but by the motive of the adventurous public service and by the unstinted encouragement and assistance given, not only by the Ferro-Alloy Section, but by the Bureau of Mines and the Geological Survey.

The development of an industry in an artificial manner, when the industry cannot hope to survive, is in a measure an accompaniment of war, but is also an industrial tragedy. The chrome and manganese situations were similar. These experiences suggest that, in another emergency, producers of materials who cannot compete with importers in times of peace should have some guarantee against eventual loss, but whether the Government can afford to develop an industry or inveigle capital into speculative enterprises, when the price of the material is five times the peace price, and in addition requires the Government to bear the capital expenditure, is a grave problem. There was a radical difference of opinion between the experts of the War Industries Board and certain experts called in by the Bureau of Mines and the Geological Survey with regard to this policy. The fundamental difference between the bureaus and the War Industries Board was that the bureaus asked all experts who joined them to work primarily for the benefit of the bureaus, the appropriations allotted to the bureaus being in a measure dependent upon the pressure they can put on Congress and the showing they can make.

The War Industries Board was after results only, and results that would not paralyze or leave an industry a blasting and withering effect. It felt that no form of Government subsidy or protection could possibly justify in

peace-times the production of materials which could not be sold at a cost that would permit industry using them. It further felt that there was neutral shipping in the world that was not controlled by the Allies and which moved to the transportation of products where the prices were unduly inflated. The only control of this shipping was by refusal to permit the importation or exportation of certain goods. In allowing a high price of chrome and manganese and similar products, there became available an adequate tonnage, and by closely watching the importation the War Industries Board felt that it could maintain a safe reserve of these important materials, and at the same time was wholeheartedly in favor of Government assistance being given to those mines or prospects which might develop commercial results or which could operate during the war, but whose capital expenditures would not be a total loss to be absorbed by the Government. In view of this policy, the War Industries Board granted at various times import licenses for chrome ore where schooners had arrived at New Caledonia and would bring high-grade ore at the agreed price.

In the opinion of the War Industries Board, it was basic that in case of war the supply of raw materials must be accomplished through the expenditure of the minimum economic effort. The stimulation of the domestic production of a raw material should proceed only to the point of balancing with the limitations of procurement abroad. The Bureau of Mines held an opposite view, and clung, in the case of the ores under discussion, tenaciously to the doctrine of unlimited stimulation and absolute restriction of importation. The Government bureaus maintained that no chrome ore should be permitted to enter the country, thus intending to force prospecting and ultimately the adoption of low-grade ores regardless of the effects on the industries.

At another time the Government bureaus recommended that all importation of manganese be prohibited and that the steel industry be forced to find a way to utilize very low-grade ores. The experts on the War Industries Board knew that this was an utter impossibility, and supported the steel industry in the position that it might mean the production

of defective steel, which would be disastrous. They thus insisted on bringing in a certain amount of high-grade material about which there could be no question, and, while they were perfectly willing to do everything in their power to assist in American production within rational limits, they were bitterly opposed to unscrupulous developments of impossible prospects and mines at Government expense. Thus, when Congress appropriated \$50,000,000 under the Minerals Stimulation Act, the War Industries Board was a party to the control of expenditures. Congress later segregated \$8,500,000,¹ to be used under the direction of the Secretary of the Interior, to compensate producers of manganese, chrome, pyrites, and tungsten for actually sustained net losses. The law was restricted to four minerals, and so limited in its application that it naturally could not be applied to compensate the irrational and unjustifiable ventures that had been undertaken.

The wisdom of the War Industries Board policy was thus fully demonstrated. It would be utterly impossible to permit the production of a product at five to six times its peace price and then be forced to pay another five to ten times the value on every ton produced owing to the necessity of compensating for the capital expenditure. In other words, the policies of the bureaus counted on an eventual payment of from ten to twenty times the peace price with a total loss of the property, whereas under the War Industries Board policy, the price would be from five to eight times the peace price with a possibility of future development, and so long as shipping could be obtained from the neutrals that would not interfere with the military shipping, the price would not rise above the market prices which were really set by the War Industries Board through the granting of import licenses carrying a specific price for the product imported.

The artificial stimulus given to impractical mining propositions, through a perfectly honest but overzealous administration of the Government bureaus, is a grave question, and should receive careful scrutiny in time of war. The Raw Materials Committee of the Council of National Defense, as early as April, 1917, made representations to

¹Act approved March 2, 1919.

the State Department with regard to chrome and manganese, and assisted in getting supplies to Brazil and in having adequate guards placed at railroad bridges and tunnels so that the Brazilian manganese supply was at no time imperiled, and its importation price through the import license system was at all times under control. Large Brazilian deposits eventually became the property of the United States Steel Corporation, and whereas, before the war, the American steel industry was practically dependent upon supplies from Caucasus and India, the American industry now has available a much nearer deposit of large magnitude. Manifestly there was little need for price control. For a short time conservation seemed imperative, but in the last months of the war the object of the section's activities was to restrict importations and sustain the domestic market for the protection and relief of the men who had responded so quickly and effectively to the call for production.

In 1916, tungsten ore, which had sold as low as \$7.50 a unit of twenty pounds of tungstic acid content, sky-rocketed to \$93.50. The domestic production was less than a thousand long tons in 1913, but under the stimulation of high prices it ascended to 4111 tons in 1917. There was feverish activity in tungsten mining in California, Colorado, Nevada, and Utah; but it was impossible to keep pace with domestic consumption, which went up to about 14,000 tons. As there was no possibility of the home output meeting the demand, and as tungsten ore in the quantity needed was not much of a tax on shipping capacity, there were no restrictions on importations. It was considered wise, also, to leave the market to itself, as it was freely responsive to supply and demand. While the domestic producers were appealed to for increased output, as a precautionary measure, it was not considered good policy to attempt to give them artificial advantages in the home market.

Tungsten is essential in the manufacture of the alloy steels that were in great demand for high-speed machine tools in the war industries. Sixteen to twenty per cent of tungsten in steel imparts to the alloy tungsten's properties of high melting point, hardness, and toughness. In the

rapid operation of machines intense heat is developed by the friction of cutting tools. Ordinary steel soon loses its temper in such a condition. Other uses of tungsten were in magnet steels, in steel for the valves of airplane engines, in X-ray apparatus, in electrical contact points, and for filaments of incandescent lamps. No satisfactory substitute has been found for tungsten in the manufacture of high-speed tools, though other alloys are also required.

While tungsten was not much of a problem, vanadium required the closest attention. Only a little is produced in the United States, and the only considerable source is in the mines of the American Vanadium Company in Peru. Vanadium is used in high-speed tool steels, automobile steels, and steel castings which are subjected to heavy dynamic strains. The shortage was very great, which necessitated every possible economy and conservation. It was necessary to supply British manufacturers with American ferro-vanadium, although they could be spared only fifty per cent of their requirements. Prices advanced from \$2.21 to \$4.76 a pound. No price control was necessary, but to insure control of distribution all importations of vanadium concentrates, as with the other ferro-alloy minerals, were consigned to the American Iron and Steel Institute, which operated through a committee on ferro-alloys.

There were some interesting experiments and developments during the war in respect of molybdenum and zirconium. Molybdenum was tried as an alloy in high-speed tools, and both it and zirconium were believed to be of exceptional value in the making of light armor plate, such as that of tanks. The Ford Motor Company, which had a large contract for tanks, was very enthusiastic about ferro-zirconium, to which it devoted a great deal of study, research, and experimentation. Both the army and the navy turned a deaf ear to the possibilities of the new alloy, and Mr. Ford appealed to the White House, where the matter was turned over to Mr. Baruch. This led to the provision by the War Industries Board of an adequate supply of zirconium ore, and, in coöperation with the Electro-Metallurgical Company, a method of producing ferro-

zirconium was worked out. The interesting possibilities of the new alloy then attracted the attention of both the army and the navy, and there followed the formation of the Light Armor Plate Board, on which the War Industries was represented.

Another steel alloy material with which the War Industries Board dealt was ferro-silicon, but here the only problem was that of securing adequate hydro-electric power for the manufacturers at Niagara Falls, as the ore is abundant. It is also used in the manufacture of hydrogen gas for balloons.

In the War Industries Board's administration the ferro-alloys were finally placed in a section by themselves under H. W. Sanford, within the Chemicals Division, but previously both Messrs. Summers and Replogle had given much consideration to the problems they involved, and industrially they were more intimately associated with the work of the Steel Division than that of the Chemicals Division.

Asbestos is a mineral product for which the United States is dependent on Canada to a very large extent. Although during the war three mines with a satisfactory product were opened in Arizona, they are too far from railways to compete with the Canadian product. However, no international complications developed. In mixture with magnesium carbonate, mined in eastern Pennsylvania and California, asbestos is used for heat insulation of pipes, boilers, and furnaces, etc. The shipbuilding, aircraft, and motor-truck activities of the war required large quantities of this insulation. There was no control of the industry beyond placing it on the preference list and requiring observance of priority, though without certificates. R. M. Torrence was in charge of this section, as well as that of chemical glass and stoneware.

Metallic magnesium, which was in the province of the Miscellaneous Chemicals Section, was an entirely new war product in the United States, but by October, 1918, three plants were producing 30,000 pounds a month and one in Canada was turning out 15,000 pounds monthly. Production was far below requirements, and, if the programme of governmental aid had been carried out, it was hoped to

bring production up to 115,000 pounds a month by the summer of 1919. England, France, and Italy were drawing on the American production, England alone calling for 250,000 pounds per annum. The metal was in demand for tracer bullets for the air services, artillery shells, alloys for castings, as a substitute for aluminum, and in gas masks; also as a flux for malleable nickel and monel metal, as a deoxidizer, and for flashlights.

Mica was more of a problem, as only the lower grades are found in the United States and the best quality is imported from India via England. The British Government made allocations to the United States, subject to Government control, which was effected through a naval commandeering order of imports. The commandeering order was later extended to imports from South America. Prices fluctuated greatly, but were stabilized to some extent through the commandeering. There was a demand from domestic producers for governmental assistance, but, after a thorough study of the subject by the section and the Association of Southern Mica Miners and Manufacturers, it was decided that neither stimulatory price-fixing nor any price-fixing would be of much avail, as there was little prospect that the Government use of domestic mica could be increased. Assistance in labor priority and the advisory encouragement of new industries was recommended. Mica was of war-time importance because of its use in spark-plugs, radio apparatus, telephones, magnetos of airplanes and automobiles, electric generators, etc. Other uses are in the chimneys of gas lights, stove windows, and in the fabrication of decorating paints and building materials. H. J. Adams was the first chief of the section and was followed by J. W. Paxton. It was later recognized and placed in the Chemicals Division under C. K. Leith. Lieutenant C. P. Storrs, a mica expert in the navy, was the chief factor in directing the control of imports.

In concluding this partial sketch of the so-called war minerals, ample credit should be given to the Department of the Interior, the late Secretary Franklin K. Lane, the department's Bureau of Mines, and the Geological Survey. Secretary Lane might be styled the great mobilizer of

the subterranean war resources of America. He was the spiritual war leader of the miners and metallurgical scientists and workers, who did their part in the war with pick and shovel and drill, with laboratory, smelter, and refinery. The Geological Survey combed the United States and even foreign countries for the minerals that were scarce, and the Bureau of Mines was tireless in determining the economic value of discoveries and in encouraging their utilization. The coöperation of the Department of the Interior was invaluable to the War Industries Board as the great purveyor of raw materials, and while distinct differences developed, as is always the case when engineer and producer, scientist and artisan, principle and practice meet, there was on the whole effective team-work between the Department and the Board.

CHAPTER XXII

THE WAR IN THE NITRATES AND POTASH SECTOR

The vital need for nitrates—Why Von Spee sought Craddock's squadron—America ignores lack of nitrates—In the war, and no nitrate reserves—Baruch and Summers take bold steps—The navy intercepts a message to Berlin—Baruch and Summers beat down the price—Securing control of Chilean sources—Nitrate shortage a constant specter of defeat—Developing potash from brine—Potash for powder, optical glass, and gas masks—Ogden Armour asks MacDowell a question—The nitrate lesson—Have we learned it?

THE World War was, of course, distinguished from all preceding wars of modern times by the fact that it was a stubborn contest between the whole moral, economic, scientific, and industrial as well as the military forces of the combatant nations. It was a one hundred per cent war of nations as opposed to the old restricted wars carried on between clearly defined units of the belligerent nations, designated as armies and navies. Strictly speaking, there are no longer any non-combatants, for, even if the narrowly non-military forces of a nation are not producing the equipment and supplies of the combatant forces, they are at all times directly in the field against the enemy in the domain of morale, thought, propaganda, scientific research, and industrial and commercial pressure and achievement.

In the United States the War Industries Board stood for the industrial corps of the nation-army with extensive auxiliary forces in commerce and science. It carried on its part of the war in well-defined sectors corresponding to the classifications of industries and materials, and always visualized itself as an industrial and economic army belligerently opposed to corresponding agencies in the enemy nations.

No part of the industrial-military grapple was more tense and breathless than that of the nitrate sector. For on nitrates are based the dynamics of projectile warfare. As water is to steam, so are the nitrates to the power that resides in explosives. On the side of the Allies the nitrate sector was entrenched in the dead plains of Tacna and Arica,

where, ten thousand miles from the battle contacts in France, are found the only important nitrate deposits in all the world. On the side of the Germans, nitrate power was based on a highly developed industrial chemistry which was capable of producing all the nitrates her war engines might consume.

It was not a purposeless adventure that brought Admiral Von Spee's fleet across the Pacific to destroy the squadron under command of Admiral Craddock in the battle of Coronel off the nitrate coast. To strike at the source of the Allies' nitrate supply was to paralyze the armies in France. The destruction of a nitrate carrier was a greater blow to the Allies than the loss of a battleship. With American fire-arms added to those of the Allies, the demand for nitrates exceeded the possible production and enforced the greatest economy and nicety of distribution to hold the fort, whilst frantic efforts were being made to bring art to the support of nature in the shape of nitrate-making plants. All the men and all the cannon America might bring to Armageddon would be powerless if the rusty tramp steamers could not maintain their drab procession from Chile to the ports of America and of the Allies. Nor was that all, for the fertility of the gardens and fields, whence the Allies drew their food supplies, depended in no small measure on the nitrates of Chile.

Nitric acid, which is made from nitrate of soda, is used in mixture with sulphuric acid to manufacture both propellants and high explosives. Bleached cotton linters, on being nitrated, become nitrocellulose, the chief propellant. If toluol be nitrated, the product is T.N.T.; if phenol, picric acid; and so on in the production of other high explosives. Not only are nitrates used in the form of nitric acid in mixture with sulphuric acid, but they are used to make sulphuric acid by the chamber process. So, as far as the Allies were concerned, the mighty forces that hurled their bolts in France, Mesopotamia, the Balkans, the Alps, at Jutland and Falkland, were latent in the Chilean deserts and nowhere else. Thus, even in the chemistry of warfare, the New World was called in to restore the balance of the Old.

The precarious situation of the United States with respect to nitrates was well understood, but virtually nothing was done to build up stores before our entry into the war, though General William Crozier, then Chief of Ordnance, had become deeply concerned over the situation a year earlier. The Secretary of the Interior offered the War Department the coöperation of his organization. General Crozier conferred with Dr. C. L. Parsons, chief chemist and chief of the division of technology of the Bureau of Mines, regarding the nitrate supply, and the Geological Survey instituted exhaustive but vain explorations in the hope of finding nitrate deposits within the United States.

In the following June the Congress, in the National Defense Act, authorized the President to direct an investigation as to the best means of producing nitrates and nitrogenous materials used in munitions and in fertilizers and other products and to have constructed such plants as might be deemed necessary, \$20,000,000 being appropriated.

There followed about a year of investigation and experimentation, the War Department, the Bureau of Mines, the Department of Agriculture, and the National Academy coöperating. The War Department paid the expenses of Dr. Parsons and Eysten Berg, an engineer, familiar with the nitrogen-fixation process in practical use in Norway, for a trip to Europe to study methods of manufacturing nitric acid otherwise than from sodium nitrate. Arrangements were made with the Semet-Solvay Company to erect a plant to determine whether ammonia could be commercially oxidized to nitric acid. The American Cyanamid Company had been experimenting with the oxidization of ammonia in the cyanamid form and permitted scrutiny of its plant, but withheld certain details. The Bureau of Mines undertook studies of the oxidization process at Pittsburgh and with the chemists of the Semet-Solvay Company at Syracuse, and a small experimental plant, similar to the Cyanamid Company's plant, was erected near Syracuse, platinum gauze being used as the catalyzer.

Messrs. Parsons and Berg did not return from Europe until the last days of the year. The former made a preliminary report in January and his final report to the Sec-

retary of War on April 30, 1918. Meanwhile a committee of the National Academy had been making studies, and turned in its report to the Ordnance Department on May 11th. The two reports were examined by a special committee of experts and practically all of Dr. Parsons's recommendations were adopted. Eventually the War Department undertook the erection of four plants, one at Muscle Shoals, and one at Sheffield, Alabama, using different forms of the ammonia process, and the others in Ohio, for the fixation of nitrogen from the air. In the meantime the United States was well into the war, and had neither nitrate reserves nor commercial manufacturing plants. Indeed, the war came to its end before the new works were completed; and we are as precariously situated to-day for a nitrate supply as ever.

Messrs. Baruch and Summers had become worried over the nitrate question for some weeks before the United States declared war. The latter had been, in his professional capacity, in close touch with the French and British supply officers in the United States, was thoroughly aware of the enormous explosives requirements of modern armies, had closely watched for ten years the development of artificial nitrate production and the coal-tar industry in Germany, and was deeply impressed by the scarcity of sodium nitrate and toluol (for the manufacture of T.N.T.).

Nitrate prices jumped thirty-three per cent when the United States declared war and another hundred per cent within three weeks. Congress had made no appropriations for purchases by the Government, and the manufacturers of explosives were taking options right and left on all sorts of materials, thus creating a fictitious demand and an artificial shortage. The whole world, outside the Teutonic combatants, was frantically buying, and Chile had all the nitrates there were. It seemed as if nothing could be done.

Then, without a cent to buy with, and not knowing of any nitrates that could be bought if they had millions, the Raw Materials Division announced that it would not be necessary for bidders for munitions contracts to attempt to procure nitrates either by inquiry or option. Not only that, but bidders were told to figure their contracts on the assurance

of getting nitrates at four and one fourth cents a pound, though at that very moment the market price was around seven and one half cents. At the same time there was much talk concerning the fixation processes. Buyers lost their eagerness and the Chileans were scared. They were sure the Raw Materials Division had a card up its sleeve. Even the large importers of nitrates were mystified.

Then Baruch and Summers carefully watched for something to make good with — and stumbled finally on the solution. The Naval Intelligence Office one day picked up a message from the Chilean Government to Berlin regarding the gold reserves the former had on deposit in Berlin. It wanted to get them released. The German Government absolutely refused to comply. Quickly the suggestion was made to the Chilean Government that the United States would supply the necessary gold if the former would confiscate the stocks of the German-owned nitrate plants in Chile, Germany being a large importer of sodium nitrate for use as a fertilizer as well as for military stocks. These had been compelled to close through economic measures taken by the British Government, which shut off their supplies of fuel, jute bags, and other necessities, but they had 235,000 tons of nitrates on hand. The Treasury supplied the gold, and the British waived their Trading-with-the-Enemy Act to permit the shipment of bags from Calcutta and also provided the loading facilities and ships.

As the Allies, through their American contracts for explosives, would share in these German nitrates, they were agreeable to a proposal that was now made to them to help the Raw Materials Division rig the market, which was that they should withdraw from the nitrate market for the last three months of 1917. The disappearance of buyers, coupled with the announcement that all the German nitrates in Chile had been seized and sold to the United States Government, left the producers "up in the air" with a record production and no market. Nitrate prices broke so rapidly that Chile threatened to be overwhelmed with a financial panic. The Raw Materials people had no desire to precipitate a real panic in Chile, but the apprehension of a panic was grist for their mill; arrangements were made to sustain the market

at a fair price and the international speculators were put to rout.

The promised price of four and one fourth cents was beaten by an eighth. There could be no better illustration of prophetic vision.

Out of this brilliant maneuver grew the International Nitrate Executive, which was merely a monopolistic pool of the buying power with which to meet the Chilean producing monopoly. It was made up of representatives of France, England, Italy, and the United States. Its offices were in London. On the part of the United States legitimate trade interests were protected by providing that the importers should purchase through the International Executive certain fixed proportions of the total amount of the Chilean production allocated by the executive to this country. To coördinate and supervise the operations of the importers, a nitrate committee was established in New York with H. Ray Paige, representing the War Industries Board, as manager. The members of the committee were representatives of the importing houses.¹ The latter were bound to deliver their imports as directed by the War Industries Board, receiving for direct Government purchases only actual expenses of transactions in addition to cost of material, and for other purchases a gross commission of two and one half per cent.

The outcome of the international pool was that complete control was secured over the Chilean nitrates. Buying was as sparing as possible, and all the time great interest was kept up over the wonderful progress being made on the artificial nitrate schemes. On the other hand, the entire Chilean nation was interested in realizing the largest possible production of nitrates as the mainstay of national prosperity. In the early summer of 1918, the shortage of coal, fuel oil, bags, and rolling stock for the railway from the nitrate fields to the coast became so severe that the earlier situation was entirely reversed, and the Chilean Government made a special offer of 680,000 tons to the Allies on condition that the needed supplies be forth-

¹Under this arrangement 36 2-3 per cent of the American share of nitrates was handled by W. R. Grace & Co.; Du Pont Nitrate Company, 33 1-3 per cent; Wessel, Duval & Co., 11 1-3 per cent; H. J. Baker & Bro., representing Anthony Gibbs & Co., 18 2-3 per cent.

coming. Through the intimate coöperation of Winston Churchill and Baruch the offer was accepted.

France was so nearly out of nitrates that supplies intended for American agriculture and some others, amounting in all to 61,000 tons, had to be diverted to that country. On May 1st, the American stock had dropped to only six weeks' consumption. This transaction was carried through by the International Executive, to avoid conflict, and the 680,000 tons were allocated by that body to the respective members of the pool.

All of the foregoing train of events had its origin in a chance meeting between Senator Smith, of South Carolina, and Mr. Baruch. Congress, alarmed by the untoward possibilities of a lack of nitrates for fertilizer, had placed funds at the disposal of the Department of Agriculture for the purchase of nitrates to be distributed to the farmers at cost. The Department had not obtained any nitrates under this authority, and Senator Smith, representing an agricultural constituency, undertook to push things a little. He went to the President, who referred him to Baruch; from whom he learned that nobody had any authority to deal with the problem. The Senator went back to the President, who told him that Baruch would have his support in handling the matter.

Starting in with this leverage of authority, the Raw Materials Division rapidly grew into the whole job. Mr. Summers, qualified with a profound knowledge of the subject, and as Mr. Baruch's assistant in charge of chemicals, explosives, and propellants, engineered the job. He had the coöperation of Charles H. MacDowell, of the Armour Fertilizer Company, who was a member of the Advisory Commission Committee on Chemicals. In November, 1917, Mr. MacDowell took charge of nitrates and other chemical materials in the Chemicals and Explosives Section. When the Chemicals Division was created, he became the director of it.¹

The farmers never got, during the period of the war, all the Chilean nitrates that Senator Smith was after, but they

¹No attempt will be made to deal comprehensively in this text with the personnel of the numerous sections that had to do with chemicals and explosives. Full information in that regard will be found in the Appendix.

did not grudge the diversion that kept the French guns busy in the spring and summer of 1918. Other nitrogenous materials were substituted to some extent, and with special care the crops of 1918 came through in good shape; but the outlook for 1919, with cumulative defertilization to be faced, was rather gloomy. The military demand for sodium nitrate was expanding, shipping was scarce, scheduled sailings were always off; locomotives, coal, oil, and jute bags to keep the *oficinas* going, were always a source of perpetual worry.

Every once in a while a German submarine would sink a poor old tramp almost at the end of its long voyage — and the whole nitrate situation was just one thing after another. At one time the diversion of a single vessel loaded with nitrates from the United States to France was all that prevented the stoppage of explosives plants in the latter country. Even England had to be helped. The minutes of the War Industries Board, correspondence, diaries, and recollections abound with apprehensive references to the nitrate situation.

The International Executive controlled the price beyond doubt, but the practical problem of keeping up production by providing the implements of production was all with the War Industries Board, which was forever haunted by the specter of a war won or lost by some mishap in the far-away Chilean deserts or in the waters between. The United States estimates alone for 1919 were put at 2,321,086 gross tons, of which the strictly military needs were 1,894,562 tons, and there was no chance of increasing the supply in 1919. The only answer was in the nitrogen synthetizing and ammonia nitrate plants then building—and, indeed, the whole programme of the War Industries Board had been to hold the fort until they should come into production. That was at best a problematical arrival.

Explosives and fertilizers are antithetic children of nitrogen and potash. Differently applied, these great elements of agricultural production become the chief implements of destruction. To divert them from the soil to the guns is simultaneously to promote destruction and restrict production. Germany struck at the agricultural productivity of the United States, and, indeed, of all the Allies,



CHEMICAL DIVISION OF THE WAR INDUSTRIES BOARD

Left to right, front row: J. R. Townsend, Sulphur and Alcohol; Dr. A. G. Rosengarten, Fine Chemicals; Dr. E. R. Weidlein, Technical Section; Robert M. Torrence, Chemical Glass and Stone Section; Charles Catlett, Fire Brick and Refractories; H. W. Sanford, Ferro-Alloys Section; Bernard M. Baruch, Chairman of the Board; C. H. MacDowell, Director Chemical Division; Ira C. Darling, Toluol and Creosote; E. A. Prosser, Tanning Extracts.

Second row: H. G. Carrell, Alkali and Chlorine Section; W. A. Barsh, Secretary to Director Chemical Division; J. A. Becker, Nitrate Section; W. G. Woolfolk, Sulphur and Alcohol; C. K. Leith, Shipping Board; T. R. Atwood, Paints and Pigments; A. R. Brunker, Heavy Chemicals; Dr. V. L. King, Dyes and Intermediates; M. F. Chase, Director Explosives Section; Major W. H. Gelsenen, Army Representative; C. D. Tripp, Ferro-Alloys Section; Dr. T. P. McCutcheon, Technical Section.

Rear row: Major C. E. Sholes, Procurement Division, Ordnance Department; Capt. H. C. DuBois, Abrasives and Electrodes; Lieut. E. A. Williams, Alkali and Chlorine Section; Prof. H. F. Staley, Ceramics; E. J. Haley, Tanning Extracts; Col. M. T. Bogert, Chemical Warfare Section; J. M. Morehead, Industrial Gases and Gas Products; Prof. H. R. Moody, Technical Section.

by forcing the farmers to forego for a time an element of fertility through the diversion of sodium nitrate to military needs. This was probably an unforeseen economic blow. But the moment she declared war she knowingly struck a blow in the same vital spot through her potash monopoly. Indeed, there were proud boasts that Germany had only to hold out for a certain period to compel the Allies to surrender to starvation, even though victorious in arms.

At the beginning of the war, Germany had at Stassfurt in Saxony, and in Alsace the only commercially available sources of potash in the world, yet potash is absolutely necessary for the maintenance of fertility in certain soils, especially for the growing of wheat, potatoes, and cotton. Potash is also used, though not in relatively large quantities nowadays, in the manufacture of black explosive powders and for many industrial purposes.

As soon as the blockade of Germany cut off the flow of potash from that country, there began an energetic and wonderfully successful attempt to produce potash in this country, in which the Geological Survey played an important part. The first commercial success was scored in the evaporation of the brine of certain alkaline lakes in the Nebraska sand hills, and later from the Searles Lake deposits in California, brines and alunite in Utah, kelp on the Pacific Coast, etc. By 1918, it was plain that the United States was, and, at a price, could be made perpetually, independent of foreign sources. As with the other war minerals the coming of peace about wiped out the potash industry, in which \$25,000,000 had been invested, it being unable to compete with the Stassfurt and Alsatian deposits, the latter, of course, falling to France with the cession of Alsace.

While with potash, as with nitrate, the Department of Agriculture was chiefly concerned in dealing with the fertilizer requirements, the Chemicals Section of the War Industries Board was closely related with it on account of military requirements. Aside from the potash required in the manufacture of powder, it was, in the carbonate form, essential to the war-created optical glass industry, and as permanganate in the manufacture of gas masks. The Armour Company was making six or eight hundred pounds

a week of the latter, and the entire production was turned over to the Government for a time at cost. The Geophysical Laboratory, in its study of optical glass, called on Mr. MacDowell for the carbonate. He recalled that the Armour plant working on alunite had turned in a few pounds of very pure carbonate; but the Laboratory required two or three tons a day.

Before committing himself, Mr. MacDowell wired to his chief in private life, Mr. Ogden Armour, advising him that it would require an investment of \$30,000 by the Armour people, with no possibility of getting out even, to meet the optical glass requirements.

"What in the devil are you down there for?" was Mr. Armour's answer.

The local managers said it would take three months to install the plant. Mr. MacDowell gave them three weeks — and inside of that time the plant was producing a little over a ton a day.

The nitrate struggle is, perhaps, the most vivid illustration of how indispensable to military efficiency is an intelligent and energetic civil body, such as the War Industries Board, in dealing with problems that must be solved if the military are to succeed and yet are foreign to military knowledge and experience.

In spite of this and a thousand other illustrations that may be drawn from the bitter experience of the World War, the National Defense Act of 1920 makes no provision for what the war showed to be our greatest weakness — the absence of an organized liaison between the striking and the power-creating forces of the Nation.

CHAPTER XXIII

EXPLOSIVES AND CHEMICAL WARFARE

Chemical action in modern war—The Board takes control of sulphur production—Five hundred thousand tons of sulphuric acid monthly attained—Nitric acid, caustic soda, chlorine—The mighty cotton linter—The rôle of alcohol—Summers warns of the T.N.T. need, and the army learns a lesson—Our powder on the Western Front—America's explosive problem and programme—The plant at Muscle Shoals—Pershing cables imperatively—The Board protests the Du Pont contract—Baruch calls in Jackling—What civilian experts did in producing smokeless powder.

THE arrows of the British bowmen, which won the field of Cressy for the Black Prince, and the artillery that Froissart tells of in his accounts of sieges of mediæval castles, were actuated by mechanical power. So it has been since the throwing-stones of the Neanderthal man. But since Constantinople fell to the Turks, projectiles have been driven by chemical force. The fighting weapons of modern nations depend almost entirely on the force released by chemical action. Perhaps the final phase of warfare will be the direct use of chemicals, as exemplified in the toxic gases of the recent war. At any rate, war has become chemical warfare. In the last analysis warfare in the twentieth century is very largely a matter of nitric and sulphuric acid.

The preceding chapter sketched the story of the raw material of nitric acid. There remains to be told something of sulphuric acid as an implement of combat and something of the forms the products of these two fundamentals of war take in their final form as controllable explosives.

As we have seen, sulphuric acid is used in combination with nitric acid to effect the nitration of certain materials for the purpose of making explosives. Before 1917, the large part of the sulphuric acid manufactured in the United States was made from pyrites ore imported from Spain. The activities of German submarines and the tremendous demands on trans-Atlantic shipping made it necessary to turn to home resources, which were found in the pure sulphur of Louisiana

and Texas, Canadian and domestic pyrites, and in the waste gases of copper and zinc smelters. The problem was to make these sources not only yield substitute amounts of pyrites, but to meet the demand for larger production. A largely increased production of domestic pyrites, chiefly in the South, was effected; but the long, expensive, and time-consuming haul from the Colorado, California, and other Western sources made it impossible except, as a last resort, to rely on pyrites.

The brunt of the burden fell on the brimstone mines, ninety-eight per cent of the production of which in the entire country was in the hands of the Union Sulphur Company and the Freeport Sulphur Company. The sulphuric acid requirements for explosive purposes were estimated to be 9,000,000 tons for 1918; 300,000 short tons of sulphur were needed for the paper pulp and other industries, and the Allies were in need of 150,000 tons. The outlook was that the brimstone mines ought to produce 1,500,000 tons, whereas their maximum capacity, as developed, was not more than 1,300,000 tons, with production actually going on at the rate of only 1,200,000 tons in the spring of 1918.

In these circumstances it was held wise for the War Industries Board to take entire control of the product of the mines. This was done by the Sulphur and Pyrites Section in coöperation with a committee of the Chemicals Alliance. With the assistance of the Shipping Board and the Railroad Administration, arrangements were made for expediting cargoes by sea and through trains by land. The price of sulphur, by agreement with the fertilizer subcommittee in the spring of 1918, had been fixed at \$22 a ton, in harmony with the Raw Materials Division's basic plan of stabilizing the prices of materials in advance of the bulging demand. This price, which was the normal pre-war price, was maintained for Government requirements, direct or indirect, although market quotations stood at \$35. Thus sulphur affords another brilliant example of the remarkable manner in which the War Industries Board held down the prices of materials.

The production of sulphuric and nitric acids was under

the Acids and Heavy Chemicals Section, and its most important work was in the encouragement of production of the former, the output of the latter always being limited by the scarcity of nitrate of soda. The total sulphuric plant capacity of the country increased from 427,000 tons a month to 501,000 during 1918, through additions to the works of the Du Pont Company, the Hercules Company, the Atlas Company, the General Chemical Company, and of smaller producers, and by Government construction in connection with the War Department's smokeless powder plants at Nitro, West Virginia, and Nashville, Tennessee. At the signing of the armistice, plants were under way with a capacity of 37,650 tons a month.

These increases were on top of large increases following the beginning of the war in Europe. Prices for Government consumption were established by agreement late in 1917 at \$18, \$30, and \$35, respectively, for the three different qualities. Following an investigation of production costs by the Federal Trade Commission, the Price-Fixing Committee, in June, 1918, altered these prices to \$18, \$28, and \$32. In September they were again reduced, to \$16, \$25, and \$28.

The situation with respect to nitric acid, in view of the limited supply of sodium nitrate, was one of conservation rather than production. Had the war continued, it would have been necessary to curtail the use of nitric acid in the manufacture of celluloid, aniline oil, and other products. Originally, by agreement between the War and Navy Departments and the producers, the Government price was 71½ cents a pound; later, at the instance of the section, the Price-Fixing Committee made the price 81½ cents a pound. This section had nothing to do with the basic nitric acid problem, the importation of nitrates being under the direct supervision of Mr. MacDowell, and the synthetization plants being a War Department project with which the War Industries Board had little direct contact, although deeply interested in promoting their success and continually spurring on these and other governmental munitions projects with all the resources at its command.

Caustic soda is another important member of the chemical

military forces. Its chief direct use as a fighting chemical was in the manufacture of phenol for picric acid, which was in great demand for explosives by the French and Italian armies. When the Alkali and Chlorine Section was formed in April, 1918, it was discovered that both the War Industries Board and the War Trade Board were correct in their position that there was no surplus production in the United States, and it was demonstrated that there was a grave shortage impending. As there were important industrial uses of caustic soda for textiles, and making soap and glycerine and drugs and dyes, it was necessary to reduce exports to South America by one third.

Thanks to the coöperative spirit of the industry, there were no difficulties in the matters of price and allocation. Plants were extended and the Government erected two new ones. Extensive curtailments were effected in the consumption of caustic soda by the cotton finishers, soap manufacturers, and lye-makers. The price had early been fixed by agreement at \$3.50 for Government account, and remained unchanged. There were five high-cost producers who could not survive at this price, and they were relieved of Government allocations and permitted to sell their product in the open market, where the price was much higher.

Only a small proportion of the country's production of soda ash was required for the military programme, directly, but the war brought a great increase of indirect demands, and both production and prices rose greatly — the latter as much as four or five times the pre-war level. By agreement with the producers, the Government's needs were met at \$1.57 a hundred pounds, as against an outside market price of about a dollar more. No control of this industry was required.

Potash, used in the making of black powder, was handled by this section, but has been discussed elsewhere.

Chlorine was needed for war purposes in the manufacture of toxic gases, materials for smoke screens, and textile bleaching powder. Besides domestic needs, France had to have three hundred tons a month. By July, 1918, it was discovered that there was a shortage of at least twenty per cent in liquid chlorine. Stringent curtailment orders were

issued, and in October it was decided to commandeer the industry, but the end of the war intervened. The Government's requirements of bleaching powder represented half the production, and compulsory orders were issued, at the same time that pulp and textile industries were cut down to one half their ordinary consumption.

Whiskey manufacturers addressed themselves to the manufacture of ethyl alcohol, after prohibition had denied them the privilege of supplying it to the human system. The dismantling of their plants was held up and in every other feasible way the production of alcohol was stimulated, as it was needed in very large quantities in the manufacture of smokeless powder, in the refining of T.N.T., for toxic gases, airplane dope, etc.

The tiny little fibers of cotton that adhere to the seed as it comes from the gin fight in chemical union with nitric and sulphuric acid in the form of smokeless powder. In them the cotton-fields of the South united with the nitrate-beds of Chile, the coke-ovens of the Appalachians, the pyrites of Spain, and the sulphur of Louisiana and Texas to spread death and destruction. So great was the demand for cotton linters that their use was denied to mattresses, pads, horse collars, celluloid, felts, and the like, and substitution, formerly "the crime of the age," but now become a cardinal virtue, supplied their place.

The cotton-seed crushers were conscripted and directed to produce no linters except for the Government, and a pool, of international scope, was created to see that everybody concerned got a fair share of the mighty little things. France, England, Canada, Belgium, Italy, American manufacturers, and the Ordnance Department, acting for the United States Government, made up the pool. The last undertook the financing and the handling of all aspects of the business except matters relating to allocation, storage, specifications, statistics, and the like, which were handled by the section. The Du Pont American Industries acted as purchasing agent for the Ordnance Department. Five hundred thousand bales of linters were acquired, but even that would not have been enough, plus future production, if the war had continued, and the substitution alternative

was closely examined, hull fiber and wood pulp being the substitute materials.

"We are not interested," said the representatives of the army and navy at the first meeting of the General Munitions Board, when Mr. Summers, in presenting the situation of the country as to explosives, spoke of the importance of T.N.T., and especially of the shortage of toluol needed in its manufacture. Within a few months the army and navy were abstracting toluol from the gas of the kitchen stove and the parlor light jets, thus adding to low living and the high cost thereof, in order to scrape together enough for the T.N.T. programme.

Nothing had been learned from the disastrous attempt of Lord Kitchener to oppose old-fashioned shrapnel to modern high explosives. But Summers knew better, and he and Baruch passed the word along to the Du Ponts to corral all the toluol they could. This was the beginning of an explosives undertaking under the Ordnance Department that involved the erection of fifty-three plants and the expenditure of more than \$350,000,000 in the next eighteen months. As in other supply matters, the parsimony and blindness of pre-war days enforced wasteful haste.

In explosives America was to make up the debt she owed the Allies, and particularly France, in guns. Guns for explosives was the friendly pact made to fit the needs and circumstances of the hour. America was to supply all of her own explosives, at least half of France's, and most of Italy's. The United States contained all of the materials for the making of propellants and exploding charges, except sodium nitrate, and she was nearer to the source of that than the Allies. As the materials weighed eight to twenty times the finished product, economy, as well as the scarcity of ocean transport, dictated that the United States should furnish the powder, just as previously sketched circumstances indicated that France should supply the guns — in the beginning.

Moreover, while the Allies had built up a great explosives industry in this country before our entry into the war, nothing comparable had been accomplished in artillery-making capacity. In the powders we got off from a running

start; in guns, from a standing start. First and last, it was American-made powder that drove half the projectiles that rained on the Germans from Goritz to Ostend. Let this not be forgotten by those dour critics who tell of the guns and shells and airplanes that did not get to the front. Also be it remembered that reserves have won many a battle without firing a shot.

As the expansion of the production of explosives was largely one of direct action by the Government, instead of reliance upon private industry, the direction and responsibility for the programme were more fully War Department matters than was the case with most commodities. At the same time the industrial effects and relations involved were so complex and so far-reaching that the War Industries Board was compelled to carry a heavy burden of coöperation with the Ordnance people; so great, indeed, that it finally had to create an Explosives Division, headed by Mr. M. F. Chase.

The explosives problem was a dual one, the two parts being propellants and bursting charges for shells—the latter being variously designated as high explosives. Before the World War, high explosives had not been as commonly used as fillers for large projectiles. The navies were formerly more interested in high explosives than the armies, but the Germans sprang a dismaying surprise in their liberal use of high-explosive shells in field warfare—so much so that the Allies were lucky to hang on while they were rebuilding their munition programmes to meet like with like. Such high-explosives powder as was in use by the American army and navy was ammonium picrate—which, of course, tended to make the military authorities further indifferent to T.N.T.

The three leading high explosives are ammonium nitrate, T.N.T., and picric acid. As has just been said, the Americans used a modification of the first and last, while the British and Germans favored T.N.T., and the French and Italians picric acid. However, the Allies had discovered that a mixture of ammonium nitrate and T.N.T. made a shell-filler that was both cheaper and more easily procurable than T.N.T., and in October, 1917, this mixture, known as amatol, was adopted by the United States army. The result was

the creation of a tremendous demand for both ingredients. The Allies had built up through their patronage of private United States plants a T.N.T. capacity of five million pounds a month, but they needed it all and more; and it would have been the height of absurdity to have interfered with their supply in order to promote the munitions programme of the American army.

Toluol was the neck of the bottle in T.N.T. production so long as the nitrate supply would hold out, although the ammonia supply, not only for it, but also for ammonium nitrate, was also a subject of deep concern. The production of toluol and ammonia was bound up with the by-product coking industry, which in turn was normally dependent for justified expansion on the patronage of the steel industry. Thus it came about that, because we had neglected our coal-tar by-products, we were weak in the material from which high explosives were made that we needed to export into the German lines with projectiles as carriers. On the other hand, just in proportion as Germany had built up her coal-tar industry, so had she ultimately fortified herself with the materials for high explosives.¹

In making it possible for the world to be cheaply gorgeous, Germany had made it possible for herself to be supreme in high explosives. To meet German readiness it was necessary for the unready America to rob the city gas plants of their toluol, build numerous by-product coke-ovens solely for war purposes with haste and waste, and expand in every possible way the production of T.N.T. The Du Pont plant at Barksdale, Wisconsin, enlarged its capacity by 2,000,000 pounds a month, and the Hercules plant at Giant, California, by 3,500,000 pounds. Contracts were let for Government plants at Racine, Wisconsin; Giant, California; and at Perryville, Maryland, calling for a monthly capacity of 12,000,000 pounds. Although none of these plants was in production when the war ended, the total T.N.T. capacity of the country had then risen to 22,000,000 pounds monthly.

As the magnitude of the requirements for propellants and explosives continued to increase, the War Industries Board urged on the War Department the necessity of providing

¹See Chapter XXV.

some substitute for the Chile nitrates. It became evident in the middle of 1917 that the programme would require a consumption of nitrates greater than the entire output of Chile.

The only recourse, therefore, was to evolve some system of obtaining the fixed nitrogen from the atmosphere. An experimental plant had been undertaken by the Government in 1916, located at Muscle Shoals, Alabama. After numerous conferences with the War Department and after repeated urgings from the War Industries Board, it was decided in December, 1917, to locate a second plant at Muscle Shoals known as plant No. 2, this plant to have a capacity of 110,000 tons of ammonia nitrate per annum.

The system adopted was a process which first makes calcium carbide and from this a product called cyanamide. The War Industries Board was in favor of this process, as it involved no experimental feature and as there were a number of plants in Europe and a small plant in operation at Niagara Falls. Furthermore, the process could be extended and furnish products of fundamental importance in the manufacture of the varnish or dope for airplane wings, and also could be used in one of the most deadly gases to be used in toxic gas warfare.

The War Department entered into contracts for the construction of the plant and had exclusive control of the expenditures made. Plant No. 2 at Muscle Shoals represented the first step of the Government to make itself independent of the importation of nitrate of soda from Chile, and marks one of the most important measures for the national defense that has ever been inaugurated. Following the armistice, a great deal of criticism was leveled at this plant, but, owing to the natural advantage of a large water-power capable of economical development, and the possibilities of utilizing the power and the plant for essential materials of war, the eventual outcome should be beyond any question of doubt.

Picric acid calls for the nitration of phenol, another coal-tar product. The United States used but little of it, but the French demand built up a great production from numerous plants, which had attained to 135,000,000 pounds annual capacity by the spring of 1918. Nevertheless, the War

Industries Board, mindful of our obligations to the Allies, recommended, early in January, 1918, that a \$30,000,000 Government picric acid plant be erected. Incidentally, it may be said that the Board at the same time recommended a like plant for the manufacture of T.N.T. Because of the shipping congestion, France and Italy could not import enough phenol, nitric acid, and sulphuric acid to keep their picric acid plants running; so they had to fall back on American production of the finished article. France undertook to take seventy per cent of the additional production, Italy twenty per cent and the United States was to use ten per cent. Instead of one large plant the Ordnance Department began three plants: one at Little Rock, Arkansas; one at Grand Rapids, Michigan; and a third at Brunswick, Georgia. At the same time steps were taken for additional production of phenol and the acids and other materials required in making picric acid.

The reader may wonder why it is that dynamite does not figure in the list of military high explosives. The reason is that it is so unstable that the shock of the discharge of the gun would burst the shell containing dynamite. That is why, in the Spanish-American War, the United States experimented with a pneumatic gun for projecting dynamite-filled projectiles into the Spanish defenses at Santiago. Since that time all the nations have developed more stable high explosives, stable enough to resist the explosion of the propelling discharge, and to require a detonator within the projectile to make it explode at the required moment. The old black-powder shells exploded by means of a burning fuse, but the high-explosives shells "let go" only in response to a priming explosion within themselves.

While high explosives were thus in use by France and England, it remained for Germany to introduce them in immense quantities and in heavy projectiles in field warfare against troops instead of confining them to naval warfare and the battering of fortifications. While the United States was a large manufacturer of commercial dynamite, required for blasting in mining operations, excavating, tunneling, and other peaceful uses, it was a tyro in the production of military high explosives in 1914.

High explosives, because of their terrific rapidity of detonation, cannot be used as propellants. The powder whose discharge drives the projectile from the gun must be slow-burning in order that its force shall be exerted in expelling the projectile instead of exploding the gun. The United States had led the way in the development of the modern smokeless powder, which it had attained in the form of nitro-cellulose whereby a slow-burning substitute was found for the nitro-glycerine which is the base of dynamite, but it had small capacity for its production.

The process of manufacture is complicated, involving almost every form of industrial chemistry, such as the manufacture of sulphuric and nitric acids, caustic liquor, the bleaching and purification of cotton for nitration, the solution and mixing of guncotton, all of the problems of the paper mill, the manufacture of alcohol and ether, generation and transmission of steam in tremendous units, and many mechanical problems.

By the time the United States got into the war, though the then developed capacity for the making of smokeless powder was large, it was far from being large enough, for it was necessary to leave intact and even augment the sources of supply of the Allies and meet incredibly large requirements of our own forces. Both the Du Pont Company and the Hercules Company increased their capacities, and two enormous Government-owned plants were undertaken; one, the "Old Hickory" plant, being located at Nashville, Tennessee, and the other at the new town of Nitro, near Charleston, West Virginia. Both are to be numbered among the most colossal building achievements in the history of mankind. Yet to-day they are nothing but scrap! The only delay in connection with them was the delay in determining upon them. The contemplated cost of \$90,000,000 for a single plant and the possible reluctance to entrust so dominating a figure in its own field—a production field now vital to the republic—as the Du Pont corporation in my opinion caused the Secretary of War to hesitate long before awarding the contract.

In accordance with the Franco-American agreement, General Pershing had cabled the War Department on August

23, 1917, that "under pain of incurring disaster" and "to avoid calamity" the United States Government must "furnish all powders and explosives needed for present contracts with the French Government," and "that the United States Government furnish by December three hundred tons per day of explosives and two hundred tons per day of powder for French consumption." This was on top of a domestic shortage of smokeless powder for our army alone of about 350,000,000 pounds for 1918 and of 450,000,000 for 1919—figuring on the then rate of production. Accordingly, General Crozier (then Chief of Ordnance) at once drafted an agreement with the Du Ponts for the erection and operation of a Government-owned plant to produce 1,000,000 pounds a day. It was still held up as late as December 13, 1917, while the War Department considered direct Government construction and operation.

The War Industries Board had from the beginning repeatedly called the attention of both the army and the navy to the grave shortage in smokeless powder capacity. Mr. Summers was placed on a committee with Admiral Fletcher, of the navy, and General Pierce, of the army, and the navy immediately undertook the extension of their Indian Head plant, which would provide for their requirements, but the army continued to hesitate and delay.

Finally, the important contract for a million pounds of powder a day was entered into between the War Department and the Du Pont Company. The War Industries Board had not been consulted concerning this contract. It protested against this, and insisted that the contract be cancelled, holding that it would be utterly impossible to grant to the Du Pont Company a contract which offered the possibilities of a profit of thirty millions of dollars or more at Government expense. It held that, if the Du Pont Company would not render its assistance in the construction of a Government-owned plant which should produce powder for the Government without profit, the Government should construct the plant with civilian experts, the War Industries Board maintaining that there were civilian experts who would construct a plant independently of the Du Ponts.

On these representations, the Secretary of War cancelled the Du Pont contract, and Mr. D. C. Jackling, a famous mining engineer, was called to Washington by Mr. Baruch to take charge of the situation. He immediately assembled an organization of civilian talent and undertook the construction of the famous Nitro plant, to have a capacity of 625,000 pounds of powder a day.

This plant produced its first powder in September, 1918, and was ninety per cent complete at the time of the armistice, having produced 4,533,000 pounds of powder and having been built by former civilian engineers.

In other words, within nine months civilian technical talent had constructed one of the largest powder plants of the world, and smokeless powder was successfully produced. This grade of powder was considered one of the most complicated and intricate products required in modern war. Mr. Jackling, on the 29th day of January, 1918, as director of the United States Government Explosive Plants Units, concluded with the Du Pont Company a contract for the erection and operation of a large plant ("Old Hickory," Nashville) at a rate of compensation calling for forty per cent less profits to be derived from construction and thirty per cent less profits to be derived from production of the powder, and with a cost base of one and one half cents less per pound for air-dried powder than had obtained in the contract of October before, which had been cancelled by the Secretary of War.

The War Industries Board had been the one critic of the policy that nobody but the Du Pont Company could construct a plant that would produce acceptable smokeless powder.¹

Both the Nitro and Nashville plants included the complete housing and equipment of a city. Each plant provided

¹General Crozier fully reviews his smokeless powder plans and negotiations in his book, *Ordnance and the World War* (Scribners), and says on page 249: "The Du Pont Company had such incomparably greater experience than any other agency in America in the construction and operation of plants for the manufacture of smokeless powder, and was so well provided with plans of construction and administrative and technical staff, in a going organization, that I had no hesitation in recommending that the company be empowered to erect and operate a plant for the Government in accordance with the proposition which it submitted."

for all steps in the manufacture, from the making of the acids and other chemicals to the complete smokeless powder. The Nashville plant started its first acid unit in June; the first acid unit of Nitro was started a few days later. The temporary operation of the Nashville plant in making powder was started in July. The Nitro permanent operation was started in August. When the armistice came, the two plants were practically on an equal footing with regard to percentage completed, the Nashville plant having produced 25,620,000 pounds of powder, and the Nitro plant, 4,533,000 pounds.

Aside from the non-Government plants of the Du Pont Company and the Hercules Company, the Ætna Company had large contracts. It had been getting its pyro-cotton from the Du Pont plant at Hopewell, Virginia, but that plant's capacity was about to be absorbed by the finishing plants of the Du Pont Company at other places. So it was decided to build a pyro plant to supply the Ætna Company, but the ending of the war made this unnecessary. Meantime, the navy had been erecting a plant at the Indian Head proving grounds with a capacity of 400,000 pounds a day.

Altogether it was figured that the United States would be producing 1,080,000,000 pounds of smokeless powder in 1919. As it was, when the end came we were actually producing daily six times as much smokeless powder as was produced in the whole of 1914, and in a few days more the output would have been almost nine times as much. To simplify the supply programme, it was planned that the Ordnance Department would purchase the entire private production of smokeless powder in 1919 and distribute it among the Allies as required. At the beginning of the war, smokeless powder cost about eighty cents a pound and the Allies had paid more than that; at the end it was down to about forty-three cents.

The careful reader of this sketch of the production of explosives will gather some idea of the multitude and complexity of the industrial problems it thrust upon the War Industries Board. All the war efforts reacted upon each other in a baffling way, but in none so much as in the indus-

trial chemistry of war. Every step forward involved numerous consequences, some of them unforeseen, and all of them requiring adjustment. Taken into consideration with the transportation, scientific, and construction problems they involved, it may be said that the production of explosives affected the entire industrial transport and technical organization of the Nation, augmented by auxiliary forces that were called into service from China on the west to France on the east, and from Canada on the north to Chile in the south.

CHAPTER XXIV

ARTIFICIAL DYES: THEIR CRITICAL RELATION TO THE WAR — OTHER CHEMICAL AND AUXILIARY MINERALS

The wonders of synthetic chemistry — We develop a dye industry — Driving up toluol and phenol production — Sulphide of soda for olive-drab cloth — Acetone for aircraft dope and high explosives — Substitutions and adaptations — A mosaic of brilliant chemical and commercial effort.

BECAUSE Germany was the master color-maker, she was also dominant in explosives. The chemicals that send colored light waves to the eye swarm with a thousand devils of death. Imprisoned in the coal strata for æons countless genii of good and evil have been brought forth by the wonders of synthetic chemistry. Released by the dry distillation of coal and harnessed together in innumerable combinations — two hundred and fifty thousand have already been tried — they serve mankind in dyes innumerable, perfumes, flavors, gases, synthetic fabrics, therapeutic drugs, power fuels, and the most terrible of explosives.

While the rest of the world jogged along in old ruts, Germany's scientists were patiently and industriously exploring the vast jungle of coal-tar derivatives, and her military and industrial lords were assiduously promoting the development of the industries that at once gave her commercial monopolies and military primacy. By one of the ironies of fate, however, it has come to pass that the brutal assertion of the latter has destroyed the former as well as itself. Germany as a military power is prostrate and the gates of the wonderland of coal-tar products have been forced by her victorious enemies. Driven by desperation to oppose her with her own weapons, they have reversed the process and become independent in industry.

In 1914, Germany was manufacturing more than seventy-five per cent of the world's supply of dyes and nearly all of the immediate derivatives of by-product coking, from which dyes and high explosives are made. The United States was producing only ten per cent of its dyes — and

even that small fraction was based on the importation from Germany of ninety per cent of the materials. Every pretentious attempt to compete with the Germans was blocked by secrecy or competitively overwhelmed. Behind the protection of prices, skyrocketing from the isolation of Germany after 1914 to as much as fifteen hundred per cent, and the concurrent demand without price of the Allies for high explosives and other ultimate products, the American dye industry expanded magically. In its train came the potent derivatives (of such by-products of the distillation of coal as coke, ammonia, gases, and coal tar) benzol, toluol, creosote oil, solvent naphtha, naphthaline, xylol, and carbazole among the primaries or crudes; and aniline oil, phenol, salicylic acid, beta-naphthol and para-nitraniline among the intermediates. Carrying the synthesis farther, by way of illustration, benzol treated with nitric acid gives nitro-benzol from which aniline is produced. In its turn aniline yields, when treated with methyl alcohol, dimethylaniline. Not less than three hundred intermediates are used in making the thousand dyes of commerce. As has already been noted, among the main sources of the explosives that are rooted in the dye industry are phenol for picric acid, toluol for T.N.T., and ammonia for ammonium nitrate.

By 1917, the dye industry had developed one hundred and thirty-four intermediates in the United States, and one hundred and eighteen different firms were engaged in the industry with an output of 287,000,000 pounds, valued at \$104,000,000. The industry was given insurance in the form of a protective tariff, in 1916, and was assisted by the confiscation of the German patents. Although by its very nature the industry was hobbled at every step by the demands of the manufacturers of explosives for identic materials, it grew to greatness and permanence before the war was over. Between the need of dyes and the still greater need of explosives the section¹ of the Chemicals Division of the War Industries Board that was charged with the supervision of the artificial dyes and intermediates had its hands full. Toluol, phenol, acetic acid, wood alcohol, chlorine, caustic soda, nitrate of soda, ammonia, and other

¹Artificial Dyes and Intermediates Section, J. F. Schoelkopf, Jr., chief.

materials of dye manufacture were placed under control — and it became the Sisyphean task of the section to keep the industry alive and growing without interfering with the manufacture of explosives. It had its full share of the eternal problem that was before all the sections which were confronted with shortages — of how to attain one end without defeating another of equal importance.

In 1914, the by-product coke-ovens of the United States were producing only 700,000 pounds of toluol a month; by 1917, this had been driven up to 6,000,000 pounds; to 12,000,000 pounds at the end of 1918, and through contracts made by the Ordnance Department would have been increased by 600,000 pounds a month in 1920. Gas stripping plants in thirteen cities extracted the toluol from municipal gas at a loss of heat and light to the people. Three contracts were let for the erection of plants for the making of toluol by cracking crude petroleum or its distillates. The three plants of one of these contracts were due alone to produce 3,000,000 pounds monthly. The entire production was commandeered in February, 1918, at \$1.50 a gallon. The production of phenol was driven up from 670,000 pounds a month in the spring of 1917 to 13,000,000 pounds in October, 1918. The stimulation of the production of toluol was partly in the hands of the Section of Industrial Gases and Gas Products,¹ which was also importantly interested in saccharine, acetylene, and oxygen.

The contrivances for curtailment and conservation in the dye industry were numerous. Because of the demand for olive-drab cloth for uniforms, the consumption of sulphide of soda was enormous; and so this kind of cloth for civilian uses was curtailed seventy-five per cent and was to be eliminated. Sulphide of soda was to have been entirely denied to the manufacture of black hosiery. Owing to these and similar restrictions and inexperience of the dye-makers, America had some sad experiences with its wearing apparel during the war.

The tobacco-chewers were pinched a little by the curtailment of saccharine used in sweetening chewing tobacco, so that more toluol might be made. War's demands for

¹J. M. Morehead, chief.

acetylene and oxygen were heavy and both the stimulation of their production and its distribution were trying tasks.

The Creosote Section¹ was confronted with the problem of there not being enough creosote for Government uses, to say nothing of private consumption. There was a minus quantity before priority was served. The army, navy, and the Shipping Board were given the preference and the Railroad Administration took all the rest. Prices were not fixed, but were controlled through the enormous purchases of the Railroad Administration, rising only from seven cents a gallon in 1913 to nine cents in 1918. Production was very greatly increased during the war. By using substitutes in the treatment of ties and by careful allocation, the situation was saved.

Space does not suffice for an account of how the Tanning Materials and Natural Dyes Section² dealt with the problems of producing, importing, and distributing the raw materials and with that of meeting the increased demand for natural dyes because of the scarcity of synthetic dyes.

In paints and pigments³ one of the problems went back to the competition of wheat with flax for growing space. The farmers rushed to the big job of providing bread for the Allies and skimmed flax, so that linseed oil for paint-making was short.

The Wood Chemicals Section⁴ became one of the most adept in playing the game of substitution. All of the primary derivatives from the distillation of wood — acetate of lime, wood alcohol, and charcoal — were in great demand, as were also such secondary products as acetic acid, pure methyl alcohol, acetone, and methyl-ethyl-ketone. The dope used by the aircraft production industry demanded all the acetone in the country, and the British needed it for their high explosive, cordite. All wood chemicals were commandeered by the War Department and their distribution turned over to the section.

Our old friend, "neck of the bottle," here took the form

¹Ira C. Darling, chief.

²E. J. Haley, chief.

³Russell S. Hubbard, first head of this section, died at his post, a sacrifice to his sense of duty. He was succeeded by Lewis R. Atwood.

⁴C. H. Conner, chief.

of acetate of lime. Increased production did not amount to much; skimping and substitution had to win the war here. Seaweed had to deliver acetone; also sour and low-grade corn thereby got into the war. Chloroform had to get along with denatured alcohol instead of acetone. Non-war industries had to do with a fifty per cent supply of acetate of lime — some of them with twenty-five per cent and others could not have any acetic acid if it was made from acetate of lime. Vinegar had to give up its acetic acid to hold the fort, but acetate anhydride, for the making of aspirin, got priority when the influenza epidemic struck the country in the fall of 1918.

In the Miscellaneous Chemicals Section¹ it was found that, while the Food Administration had taken charge of white arsenic, because insects destroyed food and arsenic destroyed them, the Chemical Warfare Service was calling for it for the manufacture of toxic gases. The glass industry was invited to get along without arsenic and the amount allocated to insecticides was reduced. For the rest, the Anaconda Copper Company was putting up a plant with a capacity of 10,000 tons per annum.

When the Germans put the Turcos to flight with their first gas attack, the price of bromine² went up 1670 per cent. The normal production of the United States was 600,000 pounds per annum. Stimulated by a price that was never less than two and one half times the normal, it went up to 1,600,000 pounds, with another 750,000-pound increase in sight, and the Government was putting down seventeen deep wells near Midland, Michigan, to get the brines from which bromine is extracted. This section dealt with camphor and metallic magnesium as well as with bromine. Camphor had a war importance of a negative nature. Not used itself to any great extent, its use in the manufacture of celluloid took nitric and sulphuric acids away from explosives. Metallic magnesium has been mentioned elsewhere.

Wool grease did not seem to possess any war use possibilities until the Germans sprang mustard gas. Then came lanoline as a dressing for gas burns, and almost overnight

¹A. G. Rosengarten, chief.

²Bromine, camphor, and metallic magnesium were under the Miscellaneous Chemicals Section.

wool grease was commandeered to make it, and taken from shoe dubbin to the pharmacopœia.

Germany had a grip on American chemical and metallurgical industries in ante-bellum times because it was thought that only the Klingenberg clay of that country was satisfactory for making linings of furnaces, crucibles, and other containers that had to withstand intense heats. With no German clay available, the Refractories Section¹ developed a satisfactory mixture of a number of American clays. The great smelting and refining activity resulting from the war gave the same section much to do concerning refractory bricks. One outcome of its activity was to inject science into the business and greatly improve the product.

The Ceramics administrator had to contend with one of the paradoxes of the war, namely, that in the midst of the terrific struggle the standard of living of the masses ascended in the United States. They wanted more and better china and porcelain. The story is told of a woman of the stockyards section in Chicago who, with her bag stuffed with the swollen war earnings, rejected all the twenty-five and thirty-dollar table sets the clerk showed her. Being a green clerk in this department, he showed her a set which an erroneously placed decimal point priced at \$287.50. She chose it the moment the price was named. The demand actually trebled at a time when, on account of the difficulties of importing materials, domestic production was able to expand only seventy-five per cent. It was the duty of the Ceramics administrator to scout for suitable domestic pottery clays, but the manufacturers were inclined to hold aloof from the American clays.

Electrodes for electric furnaces were so scarce, as were also abrasives, that it took a section to look after them.² The manufacture of large quantities of electro-chemical products created a large new demand for electrodes. There were three hundred users of electrodes and only four producers. After the section got into the saddle, every user of electrodes was adequately supplied.

The Greek island of Naxos achieved the war industrial

¹Charles Catlett, chief; H. F. Staley, of the Technical and Consulting Staff, coöperated with Mr. Catlett.

²Henry C. Du Bois was chief of the Electrodes and Abrasives Section.

spotlight as the sole source of high-grade emery for grinding and polishing purposes, especially for optical glass. The French Government controlled the supply, but there was not enough to go around. The upshot was the discovery of an artificial abrasive, manufactured by the Norton Company at Niagara Falls, which would take the place of emery. Other abrasives were also manufactured there. One of the complications was that, in the competition for hydro-electric power generated at Niagara, the abrasives industry was nearly crowded out.

The demand for containers for acids was so great that civilians had to get along with a limited number of five-gallon water bottles, to make way for the production of twelve-gallon carboys. The glass industry was put to it to meet the emergency. The same was true of the chemical stoneware industry. Chemical plants arose like mushrooms throughout the country, but by hook and crook the Chemical Glass and Stoneware Section¹ met the situation and also provided sufficient glassware for chemical laboratories and medical and metallurgical works.

In concluding the chapters relating to chemicals, mention should be made of the Technical and Consulting Staff which Mr. Summers early established to deal with special chemical problems and to look after commodities which had not been assigned to separate sections. The War Industries Board was always seeking able technical men and this is where the professors got their chance. Dr. M. T. Bogert was the first head, resigning to become a Colonel of Gas Warfare. Professor H. R. Moody succeeded him, and many professors of chemistry, including Samuel Tucker, coöperated. The Mellon Institute at Pittsburgh was turned over to the Government, without cost, for research work, and its acting director, E. R. Weidlein, was indefatigable in the promotion of the work of the Technical and Consulting Staff. The staff devoted much attention to the problems of chemical substitutes and kept an eye out for all obstacles that required chemical engineering. It fathered many of the chemical sections, and was freely and frequently consulted by the section chiefs.

¹R. M. Torrence, chief; he was also at the head of the section on asbestos and magnesia.

Pursuing an idea suggested by Mr. MacDowell, the Mellon Institute worked on toward the close of the war a substitute for platinum as a catalyzer in the manufacture of sulphuric acid, which would also be available in the making of chlorine gas, in great demand for the Chemical Warfare Service. A new catalyzer was developed for the manufacture of ammonia into nitric acid. The Institute made invaluable contributions to the development and manufacture of toxic gases, dealt with the graphite problem, experimented with motor fuels, found a substitute for glycerine (needed for explosives) in chewing tobacco, contributed to the mastering of the acetone and acetic acid problems, etc.

Incidentally, it may be said that not only the Technical Staff, but many of the commodity sections, received invaluable help from the scientists of the Bureau of Mines and Mr. Van H. Manning, its war-time chief; from the Geological Survey, from the National Research Council, from the Bureau of Standards, from the Geophysical Laboratory, from the technical colleges, and from individual scientists.

On the side of industry, when the old chemicals committee and sub-committees of the Council of National Defense were dissolved after rendering notable and pioneer service, the Chemical Alliance (Inc.) was created to deal with the Government as the representatives of the chemical industries. It was an efficient and willing coöperator ably supplemented by the Manufacturing Chemists' Association, the National Fertilizer Association, and other trade associations.

In such men as Summers, commander-in-chief, MacDowell and Chase and their able lieutenants, American industry at its best — learned, experienced, broad of vision, imaginative, creative, initiative, bold in conception, painstaking in detail, and, above all, dedicated to patriotic service — was at the helm throughout the vast and thousand-sided strategy and administration of the chemical wing of the War Industries Board.

CHAPTER XXV

THE FORESTS DO THEIR BIT — LIKEWISE THE PITS AND QUARRIES

Mobilizing the lumbermen — Edgar meets an emergency — Lumber for the cantonments — Pershing calls for timber; the forests answer — Filling demands unforeseen and gigantic: warehouses, docks, construction in France, wooden ships, aircraft, hospitals — Agreeing on prices — Curtailing news print — Building materials.

LUMBER and adventure go together. In America lumbering is still entirely dependent upon wild timber growths. To speak of lumber is to conjure up the wilderness — the virgin forests — the freshet floods. The lumberman is the huntsman of floral life — bold, strong, resourceful. To the passive resistance of the wild life he destroys he opposes the most systematic attacks and the most powerful weapons with which man masters his environment. Something of the whirling energy of his bright saws and something of the stubborn power of his log carriages adheres to his character. Lumbermaking is a quick and direct process. Its results are immediate. The rough log of an hour ago is now an imposing pile of a finished commodity. The quickness of production is matched by the alertness of management.

Appropriately enough, the first great dramatic resource-mobilization of the war fell to lumber. The lumbermen responded to the call to the colors of production with whoops that blended with the screeching thunder of their saws. They were commanded to produce the chief material of the thirty-two camps and cantonments that were to be conjured up within ninety days. Forthwith the fragrant piles of lumber at a thousand yards and mills were transferred to cars, and, before the surveyors had completed their work at the camp sites, lumber began its march to the new cities of war at the rate of fifty cars a day each; eight hundred cars a day they came, fifty-five thousand strong.

Promptness, zeal, and order marked this initial mobilization, as they did every part of the industrial part of the war

that was allocated to lumber, first and last. Thanks to the emergency construction and lumber committees of the war industrial management, the emergency bureaus of the industry, the Railroads War Board, and the very able Construction Division of the army, the lumber sector was handled systematically and without confusion from the start. The industry was inherently adaptive to big jobs and violent efforts. The bigger and the more imperative the better.

An instance: Late in the afternoon of September 14, 1917, Charles Edgar, then of the old lumber committee of the Raw Materials Division, was called to the telephone at his office in the Munsey Building in Washington.

"Hello, Edgar! This is Hamilton [major in the Construction Division]. Have you any pep left?"

"Yes; what 's up?"

"A plenty. It 's closing time and we 've just got orders to increase the size of every cantonment in the country except one; five million feet of lumber for each camp."

"Are your schedules ready?"

"Yes; they are being typed now and will be finished within half an hour. We want to get the orders out tonight."

"All right," said Edgar.

He immediately called up the emergency bureaus of the Southern pine, Georgia-Florida, North Carolina, and the Pacific coast lumber manufacturers and asked them to hold their office forces and have their respective chiefs meet him at Major Hamilton's office. There the schedules were obtained, considered and allocated to the different groups, which took them to their offices and reallocated them to their various mills. At two o'clock the next morning the job was done, and complete telegraphic orders were lying on the desks of all the hundreds of lumber executives involved when they came to their offices later in the morning. Before night of that day hundreds of cars, piled high with the specified lumber, were rolling to the cantonments.

In similar emergencies as much as twenty-five million feet of lumber were loaded and started within three days.

On one occasion General Pershing called for four million feet of special-size timbers for docks in France. The vessels

for their transport to France were to be at three specified ports within a few days, and must not be delayed under any circumstances. Although the timbers had to be cut to order, in some instances from trees still standing in the forest, almost all of the material was delivered at destination before the ships arrived.

When the cantonment job was done, the lumbermen thought their great war work was already over. As the army had not been permitted to plan for the war, it was groping in the dark itself all those first few months. It was traveling along an uncharted path. It never knew what was around the next turn. As it came to pass, the cantonments and camps were little more than a drop in the bucket. Mighty construction jobs developed at every turn. Warehouses, docks, hospitals, special service cantonments, ordnance cities, Government plants, the epic construction in France; the gigantic shipbuilding enterprise, with its lumber-consuming yards and ways and its wooden ships, the cities and towns of the Government Housing Bureau, the building of aircraft, the wheeled transport of millions, called for endless quantities of lumber and timber in every form from delicate mill-work to sixty-foot piles and the tremendous sticks for keels and keelsons. There were five hundred and thirty-five army construction projects alone, to say nothing of the navy, the Fleet Corporation, and the Housing Corporation.

Not an item of these demands was foreseen. Each was an episode. It was one thing after another; unrelated, insistent, imperative! It was a task of colossal proportions; alluring in its uncertainties, charged with all of the stimulus of the novel and the unknown. It was precisely the up-and-down sort of thing — a succession of furious outbursts of energy and sudden stoppages — that was calculated to charge with romance an industry that was reared in it. The pen of genius could write thrilling volumes of literal accounts of the war as it was fought in cypress swamps, in Southern sands, in the shadows of the lofty firs, spruces, and sequoias of the Pacific coast; and, beyond our frontiers, in the hot hardwood forests of the tropics.

First and last the Government called for five or six billion feet of lumber, much of it to be cut to original specifications

and demanding exceptional qualities and dimensions. The pine woods of the South were scouted for large trees, and the demand for airplane spruce for ourselves and the Allies tore gaps of devastation in stands of other growths to extricate the prized spruce of the Pacific Northwest. Superb things were done. General Goethals once spoke deprecatingly of the programme of building wooden ships from trees in which the eagles were yet nesting. Yet time and again a tree was moulded into ships within thirty days from its felling.

All this great and often heroic endeavor was not untinged with the color of human weakness and errancy. Lumbermen are cast in a rough mould; they are an independent, dominating crowd. Government regulations, inspection, price-making, irked them. At first blush many of them regarded the war as a golden opportunity for filling their coffers. Unlike the metal men, they entered the war with no dramatic gestures signifying a high purpose; instead, they sought and almost got away with an excessive price for the cantonment lumber. They took advantage of the ingenuousness of the early trade committee plan of the Council of National Defense.

The vastness of the industry and its thousands of units put it beyond the possibility of general commandeering. At the same time it was humiliated and offended because it was not on the War Industries Board's preferred list and thus deprived of any general priority classification. This was because private building was necessarily curtailed; in fact, almost prohibited; and because it was desired to encourage the use of wood as fuel. The lumbermen felt that a great industry was insulted, and insisted that to be off the preference list was to be branded as non-essential. Of course, nothing of the kind was true. Lumber was one of the great essentials of the war, and for all war purposes it had every preference and priority, but its civilian uses were of a deferable nature; and so for those purposes it was thrown into a category where it took what was left. Naturally enough, however, it felt aggrieved and was sure that it had been vindictively singled out for sacrifice.

The greatest friction between the lumbermen and the Board was with three members of the Southern Pine Association.

Many a battle was fought between them and Mr. Edgar. The latter was a veteran in the industry and knew it from the woods to the dry-kiln. His old associates affected to think that he was a sort of trade traitor because he was adamant for fair prices. They made extraordinary efforts to get rid of him. Even Baruch thought at first that Edgar lacked diplomacy. But these men were not subjects for diplomacy. They drove to their ends with the brutal energy of a donkey engine jerking a lurching log through the forest. Baruch found that out later when they sought to batter him down. Then, like Edgar, he tossed diplomacy out of the window, and, figuratively speaking, threw the three obstructionists after it. He refused to have anything to do with any bureau or committee which included them. Whereupon the axemen were retired to obscurity for the rest of the war.

Thereafter the lumber sailing of the War Industries Board was smooth.

On the other side of the shield is to be inscribed a tribute to the efficiency of the general coöperation of the industry with the Board, typical instances of which have been given. The great lumber sections of the country established and conducted at their own expense highly organized emergency bureaus,¹ which maintained efficient offices in Washington, and to all intents and purposes, so far as Government lumber requirements were concerned, were the executive heads of hundreds of mobilized mills. Through these bureaus the individual producers were integrated for carrying out the Government's orders. Schedules of needed lumber were split up between the different bureaus according to their nature and the situation of the member mills with respect to business on hand. Then the bureaus impartially distributed

¹The emergency bureaus were: Southern Pine Emergency Bureau; Georgia-Florida Yellow Pine Emergency Bureau; New England Spruce Emergency Bureau; Douglas Fir Emergency Bureau (later merged in the Fir Production Board); Northern Hardwood Emergency Bureau; Central Pennsylvania Hemlock Emergency Bureau; Cypress Emergency Bureau; and, for a time, there was a general hardwood bureau. There were also committees representing Northern pine and the Alabama-Mississippi section. In administering the rulings of the Price-Fixing Committee, it was decided to establish regional lumber administrators. W. J. Sowers was appointed for the territory of the Southern Pine Bureau, and T. J. Aycock for that of the Georgia-Florida region. The Fir Production Board, representing different Government agencies, looked after the War Industries Board's business in the Pacific Northwest. There was also a wholesalers' war service committee.

their schedules among the mills, according to capacity and readiness. All of this was so methodized and energized that it was no unusual thing for a hundred mills to be busy one day with an order that was merely a typewritten list in Washington the day before.

The first skirmish between the Government side and the industry was on June 13, 1917, when R. H. Downman, chairman of the Lumber Section of the Raw Materials Committee of the Advisory Commission, met with representatives of the Southern Pine Association to consider cantonment lumber requirements. A basic price of \$20 eventuated, though a higher one was named until it was discovered that it was actually above the market price. The emergency nature of the order was advanced as the explanation of the attempt to make the Government pay more than the public — but this explanation was brushed aside. The \$20-figure represented an average price for the different kinds and qualities of lumber of about \$24.85 a thousand. Slight reductions were effected in the fall on three different occasions, bringing the average price down to \$23.20. Later, as the costs of production advanced, the Federal Trade Commission made an investigation and a special committee of the Price-Fixing Commission discussed the subject fully with representatives of the yellow pine manufacturers.

About the middle of June, the Government price was raised to approximately \$28 a thousand. A demand for a further advance was under consideration when the armistice was signed. The price agreement protected wages, gave the Government a standing option on private orders, and provided for the furnishing of information and reports the Board might require. Although the Board agreed to the price of \$105 for airplane spruce, fixed in June, 1917, in conference, and of \$35 established for wooden ship lumber in May of the same year, it may be said as a general rule that in special requirements, such as airplane spruce, shipbuilding timbers and lumber, hardwoods for ordnance purposes, etc., the respective purchasing agencies handled the situations themselves.

In December, 1917, the Board, feeling that the commandeering power was an empty thing as applied to such a

decentralized industry as lumber — since it was manifestly impossible for the Government to take possession of thousands of mills, forests, logging railways, distributing machinery, etc.— and that, therefore, public price control would be difficult, recommended that it be clothed with direct statutory authority to fix lumber prices. This recommendation does not appear to have been followed up, and eventually the Board undertook to fix maximum prices for softwoods. Contrary to early expectations, little difficulty was encountered in this task. The object in view being diametrically opposite to one of the objects in most price-fixings — that is, to discourage instead of to stimulate production — these prices were closely trimmed, averaging about \$2.75 above the Government price.

Production beyond minimum requirements was further checked by the activities of the Non-War Construction Section of the Priorities Division. Manufacturers and distributors of lumber, like all producers of building materials, were required to sign a pledge to deliver lumber only for essential purposes or on express, written permits. Conservation restricted the use of hardwoods, which were scarce, and in some lines softwoods. Generally speaking, though, lumber conservation was incidental to the conservation of other materials and of transportation. Its use was restricted, not because it was scarce, but in order to reduce production, with its savings of men, machinery, materials, and transportation.

While lumber manufacturers were not on Preference List No. 1 of the Priorities Division, designed primarily as a guide in the allocation of fuel, many industries consuming lumber were on it, and on list No. 2, the wood-consuming industries were given priority groupings. All Government requirements, however, carried with them the necessary priority privileges. Just before the end of the war, the Priorities Commissioner issued a circular closely defining the restrictions under which the lumber industry would be expected to operate.

R. H. Downman, then president of the National Lumber Manufacturers' Association, was chairman of the original council committee. Later, with the coming of the plan of disassociating all coöperative committees from the War

Industries Board, Mr. Downman became chief of the Building Materials Division. Owing to illness he was compelled to resign. A lumber division was then established with Mr. Charles Edgar, a retired lumberman, with extensive experience in Wisconsin, Minnesota, Arkansas, and elsewhere, as chief.

Among Mr. Downman's more active assistants, aside from Mr. Edgar, who was early on the job, were E. T. Allen, Charles H. Worcester, and Frank G. Wisner. To Mr. Allen belongs much of the credit for the comprehensive handling of the spruce production problem which finally became the exclusive province of the Aircraft Production Bureau of the Signal Corps and Air Division. Major A. M. Cooke, of Norfolk, Virginia, was Mr. Edgar's first assistant, and his staff included Captain E. A. Selfridge, Jr., Willits, California; M. E. Philbrick, Memphis, Tennessee; W. E. Chamberlain, East Cambridge, Massachusetts; F. H. Ransome, Portland, Oregon; H. W. Aldrich, Mill City, Oregon; C. Y. Winton, Minneapolis, Minnesota. The Fir Production Board was composed of J. H. Bloedel, General Brice P. Disque, and H. B. Van Duzer.

The Lumber Division had to deal with one of those gangs of bloodsuckers who are always on hand in war-time to disgrace humanity when others are honoring it. A number of unscrupulous jobbers of the curbstome variety conceived the idea of having lumber surreptitiously consigned to construction officers in care of themselves. Such shipments gained transportation priority and got lumber into the possession of the crooks when other dealers were without it. They would then go to the construction officers, who were always short of lumber because of transportation congestion, and extort a price of eight to twelve dollars a thousand above the fixed Government price to producers. The scheme came to light when the producers began to inquire why it was that there was one price for orders coming to them for Government account through the bureaus and a higher price for orders from these jobbers. Every car that got through on this fraudulent billing — and there were hundreds of them — took the place of a regular Government car and made the dealers a profit of from \$150 to \$250 a car. Mr. Edgar

discovered one of these deals in time to stop payment after \$75,000 had been paid on account. The manipulator of this particular deal had the nerve to invoke "influence" to bring pressure to bear on Mr. Baruch to intervene, but was shown the door. Nevertheless, the Court of Claims eventually allowed the jobber the whole of his claim at Newark market prices; despite the fact that eight of the same kidney, caught in the meshes of the Department of Justice, had to disgorge \$35,000 apiece.

The problem of getting lumber for Government purposes was one of transportation instead of production. At one time there were seventeen thousand loaded lumber cars jammed up south of Richmond, Virginia.

Closely associated with the lumber administration, though in another general division of the Board, that of Finished Products, was the Wood Products Section which was established in October, 1917, chiefly to help the army obtain hardwoods for its various vehicles with wooden wheels. There was found to be a real shortage of dry hardwoods, and arrangements were made for the Government to assist in providing adequate dry-kiln facilities. Later, the chief work of the section was to plan the allocation of Government requirements among the twelve thousand woodworking establishments in such a manner that they might continue to exist, as the capacity greatly exceeded war requirements. No real shortages of finished goods existed at any time. Black walnut was so scarce that it was necessary to inaugurate a campaign of education to increase production, which had an element of the picturesque with its squads of Boy Scouts scouring the forests and woodlots for walnut trees.

One of the knottiest problems that came before the War Industries Board was that of pulp and paper, particularly newsprint. As this industry drew on materials that were needed in munitions, and was a heavy consumer of coal, labor, and transportation, it was early marked for drastic curtailment; while the mounting prices of paper called for price-fixing. The situation became so desperate that the Board had decided to control and allocate all newsprint after November 15, 1918. The Pulp and Paper Section was created June 6, 1918. W. B. Colver was the first chief. He

was succeeded by Thomas E. Donnelley, and on October 1, 1918, the section was made into a division.¹

The first work of the division was to take up with committees of the industries the subject of the elimination of wasteful practices and the reduction of the quantities of chemicals consumed. On pledges of such economies the industry as a whole was put on the preference list, Class IV, for coal and transportation.

The biggest job that fell to the division was the working out of a series of regulations for thirty-six industries consuming large quantities of paper. The publishers, who had enthusiastically backed the conservation programme for others, found it a horse of another color when it came to be applied to the size and number of their publications. Daily and weekly newspapers were cut down fifteen per cent; Sunday newspapers, twenty per cent; periodicals and general job-printing, twenty-five per cent. Each of the paper consuming industries initiated its own curtailment programme, through its war service committee. Its suggestions were reviewed by the division, and then, after further consultation, regulations were drafted and issued. In dealing with the publishers many complex questions arose, which were of a highly technical nature, and not susceptible of interesting presentation in a book for the general reader.

While the division did not attempt price control, the price of newsprint was finally fixed through congressional initiative. The price of this commodity had become so high before the United States entered the war and publishers were suffering so severely that Congress directed the Federal Trade Commission to make an investigation of costs and prices. On June 30, 1917, the Commission reported that \$3.10 a hundredweight was a fair price. After many appeals and hearings, this was established as the base price, April 1, 1918. In the fall of 1918, the United States Circuit Court for the Southern District of New York, acting as arbiter, fixed the price at \$3.50; later still, the Federal Trade Commission advanced the base price to \$3.7525.

¹The division was divided into a Manufacturing Section, S. L. Willson, chief; Paper Economies Section, Isaac W. Blanchard, chief; Newspaper Section, G. J. Palmer, chief; Fiber Board and Container Section, Harold W. Nichols, chief.

The Building Materials Division, with Richard L. Humphrey as director, was established in March, 1918, though the supervision of the industry had begun with cement as early as April, 1917, Eugene Meyer, Jr., then looking after it, as well as the non-ferrous metals. Lumber and steel were controlled otherwise, as we have seen. Sand, gravel, and crushed stone soon followed cement under the old committee organization.

The division devoted itself principally to Portland cement, brick, hollow tile, gypsum, plaster board, and wall board. These materials, if not abundant, were generally in sufficient quantity; though, owing to transportation congestion and local conditions, there were often sectional shortages. The single general exception was gypsum and plaster board, of which Government requirements were twice as great as normal production capacity. Consequently the Government had to take over the industry, allocate orders and fix prices.

In general, the chief work of the division was to promote curtailment of production in order to make way for the emergently essential industries and to assist the various procurement and construction agencies of the Government in meeting their requirements. The general method of procedure was the same as with lumber. Prices were fixed on cement and brick for Government use, and the industries voluntarily kept the public prices near the Government prices; while, under the Non-War Construction Division of the Priorities Division, non-governmental uses were cut to the bone, virtually all building and road-making, except for war-promotion purposes and exceptional instances, being stopped as has elsewhere been related.

Local conditions in the congested northeastern district became such in the spring of 1918 that it was necessary to fix prices and allocate orders for sand, gravel, and crushed stone in the New York, Baltimore, Washington, and Norfolk districts. There were then in course of erection, between Washington and New York, alone, not less than fifty-four big Government projects.

The work of this division was so broad, covering in detail as it did forty-three important industries with thirty-eight war service committees, that a mere sketch of its activities



BUILDING MATERIALS DIVISION, UNITED STATES WAR INDUSTRIES BOARD

would fill a sizable volume, and anything less would be but a dull generalization. It employed a staff of fifty-five persons besides making use of the clerical staffs of the governmental agencies with which it coöperated. One of its outstanding achievements, outside the usual run of price negotiations, priority administration, allocation, etc., was the standardization of schedules for war building projects. This was accomplished in carpentry, millwork, composition roofing, slate roofing, clay tile roofing, gypsum wall and plaster board, fiber wall board, finishing hardware, door-hangers and track, plumbing and gas fitting, heating, electric wiring and light fixtures, painting, hollow building tile, magnesite stucco, fire prevention and protection devices.

The history of the building materials industries — aggregating the second or third largest trade interest in the United States — in the war period is one of startling contrasts. On one side there was the misery of curtailment and restriction, an enforced decline in activity and prosperity in the midst of a general boom and great prosperity. On the other side were the tremendous outbursts of productive energy to meet occasional emergencies and urgent demands for certain commodities.

CHAPTER XXVI

LEATHER AND RUBBER GO TO WAR

A million sets of harness — Fifty million pairs of shoes — Regulating the shoe trade — What might have happened — Rubber an economic freak.

MAN's ancient ally in war, the horse, came back from his eclipse by motor vehicles to take his part in the black drama of the greatest of wars. His recrudescence revived a decadent industry — that of harness and saddlery — and by demanding a million sets of harness contributed to the violent strains to which American industry was subjected during the war. Despite motor transport, the fighting men wore out shoes in prodigious quantities, and there were other great demands for leather. So huge was the total of all military demands that the civilian was doomed to get along with about a quarter of the normal leather product of the country.

Indeed, there is evidence¹ that if procurement officers had not rebelled at the mountainous size of the leather requirements passed on to them, the satisfaction of army orders would have taken all the hides in the United States and three hundred thousand more. Men who had figured requirements for troops, batteries, and companies in peace-time were afloat on an uncharted sea when it came to calculating the leather needs of an army of five million to seven million men that had to be projected at least six to eighteen months ahead because of the time that elapses from the taking of a hide until it can become the finished product. It takes as long to build a shoe, from the animal's back to the finished product, as it does to build a ship from ore to commission.

The American leather and leather-consuming industry is a Colossus in the age of industrial colossi and was well prepared for the war orders that came to it in bales, often with very little anticipation. The United States makes more leather than all Europe and consumes in proportion. The

¹Testimony of Colonel George B. Goetz before House of Representatives Select Committee on Expenditures in the War Department, page 1403, vol. II, of the Ordnance Sub-committee hearings.

war-time weakness of the industry is that it has outgrown the domestic sources of hides. A third of the cowhides and kips, three fourths of the calfskins, eighty-eight per cent of the horsehides, and sixty-seven per cent of the sheepskins tanned in the United States are imported. With the restriction of shipping space, importations were greatly reduced and, at the same time, such extraordinary demands as 50,000,000 pairs of shoes, 1,000,000 sets of harness, about 3,500,000 leather jerkins, and more than 7,000,000 pairs of heavy gloves had to be provided for our army alone.

As an offset to the limitations of imports was the fortunate fact — though at the time it seemed most unfortunate — that, owing to the restrictions imposed by the United Kingdom in the spring of 1917 on importations of leather, there was a large supply on hand, accumulated in anticipation of continuing exports. Moreover, there had been an extraordinary increase in the domestic production of hides, owing to the demands of the Allies and of neutral nations for meats and the consequent stimulation of the live-stock business. Consequently there was no great disturbance in the industry occasioned by the entrance of the United States into the war.

In the first months after that event, a Leather and Shoe Committee and a Leather Equipment Committee of Mr. Rosenwald's division of the work of the Advisory Commission of the Council of National Defense handled the army's leather needs; which were slow in developing, outside of shoes. Of the latter it was the means of providing some eighteen or twenty millions of pairs. But when the War Trade Board took charge of imports, when shipping space was drastically restricted, and the Government began to come into the market for incalculable but vast quantities of leather products, the situation completely changed, and it was seen that comprehensive control of the industry from ultimate sources of materials to distribution of products must be undertaken.

This comprehensive control had not been fully worked out when the war came to its end, but it had evolved a unique relationship between the army and the War Industries Board, which amounted to a blending of the two in regard to the

handling of leather. The fusion came about in this way: In the first part of February the Quartermaster Corps decided to coördinate army contracts with the leather industry for the purpose of insuring adequate supplies and proper qualities for its own uses and also to protect the civilian population from unrestrained consequences of its enormous demands.

Mr. C. F. C. Stout (of John R. Evans & Company, Philadelphia), who had submitted a report on the leather situation, was then made chairman of what was called the Hide and Leather Control Board of the Supply and Equipment Division of the Quartermaster Corps. Later it was made a branch of the Hide, Leather, and Leather Goods Division. When the War Industries Board was reorganized in March, 1918, Mr. Baruch made Mr. Stout chief of the Hide, Leather, and Tanning Materials Section of the Board. (The tanning materials part of the work was transferred later to the Chemicals Division.) Mr. Stout was thus in and of the War Department and the War Industries Board, but his staff was in the former.

In the following October, the staff was transferred to the War Industries Board, with the exception of the field men. It had nine sections or bureaus as follows: Foreign Hides and Skins, O. C. Howe, chief; Domestic Hides and Skins, Lewis B. Jackson, chief, Arthur L. Webster and Arthur T. Goding, assistants; Sole and Belting Leather, H. W. Boyd, chief, succeeded by W. B. Eisendrath; Harness, Bag, and Strap Leather, F. A. Vogel, chief; Sheepskin and Glove Leather, E. C. Shotwell, chief; Boots and Shoes, C. D. P. Hamilton, chief; Harness and Personal Equipment, C. A. Rogers, chief; Belting, G. B. Rowbotham, chief; and Gloves and Leather Clothing, H. J. Lewis, chief.

Sheepskins for leather jerkins were first of the leather commodities to be put under control. On March 20, 1918, the packers and wool-pullers met in Washington and agreed to give the tanners of jerkin leather an option on all picked sheepskins at a maximum price of fourteen cents a square foot; and the tanners agreed to dress the skins at four cents a square foot. This agreement was equivalent to the taking over by the army of all such pelts. It ran until June 7, 1918,

and made no provision for prices to the public. When the agreement expired, the Price-Fixing Committee issued a schedule of maximum prices for sheepskins, varying from eight to eighteen cents according to quality. With slight changes in October, these prices prevailed until after the war. In April, the Price-Fixing Committee established maximum prices for cattle hides and made several revisions thereof in the interval before the end of the war. The necessity for allocating stocks did not arise, but, in conjunction with the War Trade Board, importations were allocated.

The maximum-price plan for hides and skins was far from being satisfactory, and if the division had the job to do over again it would probably insist on licensing every dealer to do business within the maximum prices under penalty of losing his license in case of overstepping the limit. It was also felt that prices were changed too frequently.

It would be wearisome to undertake to trace the operations of all the sections. An interesting feature of the general work was the development of the heavy "Pershing" and later the "Victory" shoe for the soldiers in the trenches, it having been found that the American army shoe was not heavy enough for that kind of use.

The first step toward entire control of the industry was taken on June 29, 1918, when the Conservation Division issued a set of regulations for the reduction in the number of styles, colors, and lasts of shoes and eliminating certain wasteful fashions altogether. Each manufacturer pledged himself to obey these regulations and thereby got himself placed on the preference list for fuel and transportation. This pledge system was substantially the same as was applied by the Priorities Division throughout industry.

The soaring prices of shoes, as well as the scarcity of leather for military purposes, inevitably indicated that the War Industries Board must get down to a detailed price and model regulation in the shoe business that was hardly known in any other part of its field. With that singular perversity of human nature, which makes it delight to revel wantonly in the scarce and expensive when necessity's demands are most pressing, women's fashions called for a different color of glazed kid shoes for each gown; and the shortening of

skirts was followed by the heightening of shoes — just when the price of glazed kid was three hundred and fifty per cent above normal and there was a menace of a general shortage of leather.

At first it was proposed that there be but a single type of black leather shoe, and that the wholesale price should be stamped on the sole of every shoe to provide a check on the cupidity of retailers. This last suggestion was stubbornly opposed by the trade. After a long series of conferences, some of a very warm nature, the boot and shoe manufacturers finally yielded to a programme, applicable June 1, 1919, which confined shoes to black, white, and one shade of tan, in color. Heights were fixed, the introduction of new lasts was forbidden, and certain wasteful styles were discarded. As to quality there were to be four grades. Class A was to retail at \$9 to \$12 for high shoes and \$9 to \$11 for low shoes; Class B, at \$6 to \$8.95; Class C, \$3 to \$5.95; Class D, below \$3. To get around the objection to having the wholesale price stamped on the shoe, it was directed that each shoe was to be stamped with a key number, so that the purchaser could assure himself that he was getting a shoe in the represented price grade. Retailers were to be required to display placards, explaining the price scheme, and pledges of compliance with the regulations were required all along the line. The conservation programme would not only have saved the consuming public millions of dollars, but would have relieved the trade from the burden of \$100,000,000 worth of stocks needed to meet the great number of styles and models in ordinary demands.

While leather shod the doughboys on the road to victory, rubber shod their transport. There was no lack of either for the Allies, and their enemies were pinched for both. Paper shoes and metal tires for Teutonic locomotion were signs of the downfall of the empires of the Hapsburgs and the Hohenzollerns.

Rubber was one of the economic freaks of the war in that its price was in no wise affected by the political and commercial reactions which upset pretty much everything else. It was unaffected by the beginning of the war in Europe and it never revealed a tremor after the United States entered

the international lists. It was even so conservative that it refused to ascend to the maximum prices prescribed by the War Trade Board. Yet the United States produces no crude rubber and is entirely dependent on imports, most of which come over long ocean routes — from Brazil and the East Indies.

While we were having convulsions in the control of some commodities of which we were the chief if not sole producers, we had an easy job with the one bulky commodity, outside of nitrates, which we did not and could not produce at home. Moreover, though the United States is not a producer, it is by far the greatest consumer of rubber and manufacturer of rubber products. The basic explanation of the anomalous calmness of rubber in a world of economic stress and storm was somewhat paradoxical; prices were not shoved up by the foreign producers because we took so much of their product that they dared not risk a move that might reduce consumption. To put it in another way, production from rubber plantations had increased so rapidly that, when the war forced Germany and Russia out of the market, the producers were so much concerned for outlets that they were in no mood to apply the screws.

The only necessity for any regulation of rubber arose from the lack of ships for its importation and from the desirableness of the conservation of men and materials in every phase of the war effort. The lack of transport caused the War Trade Board to put a limit on the amount of rubber that might be imported — a limit which necessitated economy; but at the same time it fixed prices, compliance with which was the only means of getting licenses to import. But stolid rubber did not rise to these prices. As the War Trade Board did not act in this matter until May, 1918, and ample cargoes of rubber had been crossing the Pacific prior to that time, there had been no occasion for the War Industries Board to act. Thereafter, control became necessary and the Rubber Section (placed administratively in the Textile Division) was established in August, with H. T. Dunn as chief.¹

¹J. W. Rowland and J. C. Matlack were assistants, and George E. C. Kelley, auditor.

All importations were cut down about one third, and, as war uses demanded thirty thousand of the admitted one hundred thousand tons for 1918, considerable adjustments were necessary. The restriction of the automobile industry was an important factor, as seventy per cent of the rubber imported into the United States goes into tires and tubes. The number of types of tires was reduced. Then, on September 21, 1918, the Priorities Commissioner issued Circular No. 24, which put rubber among the controlled industries in the customary way. The circular recommended that models, sizes, and styles be cut down in all lines of rubber goods, and limited the production of tires and tubes for the last three months of 1918 to three fifths of fifty per cent of the normal output for eighteen months.

The rubber trade was so much impressed by the helpless dependence of the United States on foreign sources for its crude rubber — though no unpleasant consequences arose during the war — that its war service committee ventured to make a suggestion to the American delegates to the Peace Conference. It was feared that Holland and the British Empire might be tempted to use their near monopoly of the raw material to build up a monopoly of manufacturing. Consequently the committee recommended that the American delegates should insist on guaranties from the British and Dutch Governments that American manufacturers should have access to the raw material "upon as favorable terms as the manufacturers of any country."

CHAPTER XXVII

WAGING WAR WITH TEXTILES

Blotting out Civil War scandals—The early Rosenwald Committee—Clothing the fighting millions—The final stupendous requirements—The reign of wool—The story of "shoddy"—Mobilizing the cotton goods—Eight hundred million yards for the army—The industry falls into step—Gingham-makers produce uniforms—Cromwell cracks the whip.

THE Civil War put a brand of shame on the American textile industry. Old soldiers still tell of the rotten fabrics of their uniforms—and the army clothing contractor of the internecine struggle was for fifty years the type *par excellence* of the home-staying leech who fattened on the profits of fraud while the soldiers bore the brunt of the Nation's travail. The brand was not erased by the lapse of sixty years when the World War once again called upon the textile trade to clothe the fighting millions of America.

Here was the opportunity to cover the old shame with a new honor. It was fully availed of, and availed of under inevitable circumstances that made the industry the guardian or the defiler of its own escutcheon.

It was humanly impossible for the Quartermaster Corps, or the organization of the army that subsequently assumed the quartermaster function, to deal with the stupendous tasks of providing clothing for the mounting millions of the Republic's armies without mustering into its service the captains of the industry. Equally impossible was it for, first, the Council of National Defense, or, later, the War Industries Board to discharge their coöperative functions without endowing with regulatory powers the very men who were to be regulated. None but great textile manufacturers and dealers could apply business acumen to the expenditure of something like two billions of dollars for the clothing, tentage, and miscellaneous textile equipment of the armies. Only they could marshal the columns of mills, only they could determine fair prices. Put on their honor, these men in various capacities rose above personal considerations,

above trade friendships and group loyalties, forgot personal gain, and served unswervingly the interests of the Government and Nation. Taken from the sellers and producers and placed on the side of the buyer and consumer, they never doubted for a moment what their duty was or hesitated for an instant in following its commands.

That is really the big thing of the war in the textiles — not the millions of garments produced or the billions of yards of cloth woven. It was the big thing of the war in almost every line of supply — the incorruptibility of the American business man commandeered for Government service. It is a record of moral integrity developed by the war that may well be placed in the balance against the demoralization of character that seems to have been one of the foul legacies of the war.

Notwithstanding all the slander to the contrary, the great task of meeting the first supply emergency in the chaotic days of the spring and summer of 1917 was met just as honorably, ably, and faithfully by the volunteer committees of the industry, attached to the Government only by the mere name of an Advisory Commission Committee, as it was later by some of the men of these same committees when they were divorced by formal direction from their old trade associations and were commanded henceforth to be the servitors of the Government. Had they not been of good stuff in the first instance, they would not have been in the last.

The major part of the War Industries Board, whether in functional or commodity capacities, had its roots in the old Committee of Raw Materials of the Council of National Defense organization; but the textiles, like leather, go back to the Committee on Supplies, of which Julius Rosenwald, of the Advisory Commission, was chairman. In a general way of speaking it may be said that the Finished Products administrative division of the War Industries Board was the heir of the Supplies Committee, though it dealt also with matters that were never within the province of the committee.

Mr. Rosenwald's chief of staff was Charles Eisenman, a retired textiles manufacturer; and to his assistance in the work of advising the Government regarding its textile purchases he summoned a sub-committee of manufacturers of

woolens, another of cotton goods, and a third of knit goods. These committees, acting with purely trade committees, constituted for nearly a year the fabric of governmental relations with the respective industries.

The storm of public protest against the so-called buyers-and-sellers committees centered chiefly on these three committees, and during the drifting period in the development of the War Industries Board their staffs and to some extent their executive personnel were taken into the reorganized army supply department, which for a time virtually essayed to fill the whole field of contact between the War Department and the textiles as well as in other finished goods, leaving to the Finished Products Division of the Board little but the name. Some of the men remained there till the end of the war, while others returned to the War Industries Board when it gained vigor and authority with the appointment of Mr. Baruch as chairman.

Incidentally, it may be said, that to such an extreme degree for a time, and to such a large degree all the time, did the Clothing and Equipage Division of what became the Office of the Director of Purchase and Storage of the Division of Purchase, Storage, and Traffic, headed by Major-General Goethals, function in what was properly the zone of the War Industries Board, that it is very difficult to write with precision of the credit and responsibility for much of what was accomplished in the textiles sector.

In any event, great credit goes to the Supplies Committee and its subsidiaries. Mr. Eisenman passed off the scene about the end of 1917, but, in an uncharted field, harassed by unjust attacks, and not always properly supported from above, he had laid the foundations of a firm structure of coöperation between the Government and the textile industries. Through his committees were handled 45,000 contracts aggregating \$800,000,000 at an administrative expense of only \$20,000. His honesty, courage, and fidelity to the Government were beyond question.

The various textile sections were finally grouped into a Textiles Division with John W. Scott as director, having as his assistant Henry B. Ashton. Spencer Turner, who had been acting chairman of the old coöperative Committee on

Cotton Goods, then became chairman of the Cotton Goods Section, having as his assistants Grosvenor Ely, George F. Smith, Burton Etherington, and Ralph E. Loper; Lincoln Cromwell, who was chairman of the old Committee on Knit Goods, became chairman of the Section on Knit Goods, his associates being Rufus W. Scott, F. E. Haight, and John McCauley; and Herbert E. Peabody, who, as the active member of a committee of the American Association of Woolen and Worsted Manufacturers, had been the liaison man between that committee and the Rosenwald Committee on Woolen Manufactures, became chief of the Woolens Section,¹ assisted by A. L. Gifford. With this much of an organization background, the story of achievement may now be told, in its high lights, without regard to nice distinctions of personal or group credit or responsibility.

Aside from the rush of equipping the first troops called to the colors, the woolen goods manufacturers never had any difficulty in meeting the Government's demands throughout the war, so far as their productive capacity was concerned. The real woolen problem was that of the supply of the raw material — wool. The first troops got some queer and miscellaneous supplies, chiefly in blankets, picked up here and there and made up from heterogeneous goods that happened to be on hand. After that there was never any real difficulty in meeting the growing demands of the army; of blankets, 19,400,000 pairs were produced; of woolen coats, 12,365,000; of woolen trousers and breeches, 17,342,000; of flannel shirts, 28,869,000; of overcoats, 7,748,000; of woolen stockings, 90,000,000; and much else besides.

The nominal requirements of the army were so great that the needs of civilians were virtually ignored. If there happened to be any wool left at any time, the civilians got

¹The other sections were:

Cotton and Cotton Linters Section. George R. James, chief; George W. Naumburg, assistant; Sherburne Prescott, assistant.

Felt Section. Sylvan Stroock, chief.

Flax Products Section. George F. Smith, chief.

Rubber and Rubber Goods Section. H. T. Dunn, chief.

Silk Section. William Skinner, chief.

Domestic Wool Section. Lewis Penwell, chief; William D. McKellar, assistant.

Foreign Wool Section. A. M. Patterson, chief.

it. Toward the end of the war the army turned in requirements based on the immediate supply of 7,000,000 men. There was not one third enough wool to meet such a programme. Mr. Peabody was aghast. It is certain that if the army had insisted on its schedules as they stood for urgent delivery — assuming that the war had gone on — there would have been no woollen clothing for civilians in 1919 and thereafter that had not been already manufactured.

Facing such a possibility, the wool section men were very philosophical, though they dreaded the storm of complaint that would come. They knew that, as a matter of hard fact, the civilian population could get along with old clothes for a year without any great hardship. In the spring of 1918 only forty-five per cent of the woollen mills were on Government work, and the others were unable to get new stocks of wool, as the Government had it all. The chief problem before the wool section was what was to be done in the future with these mills and with the supplying of civilians. Plans were under way for the conversion of some of the mills to other war work, and an exhaustive survey was made, through questionnaires and by other inquiries, to ascertain just what were the private stocks of wool and the amounts of manufactured fabrics and clothing. Some of the conservation steps taken through the Conservation Division, as well as the Industrial Adjustment Committee, have been noted in the chapter on the Conservation Division. But, at best, the prospect was that the people would have to go on an old-clothes basis with a golden era for the second-hand clothing men and a period of vacuity for clothing stores.

With its control and monopoly use of wool stocks and, therefore, its control of the whole woollen textile business, the War Department virtually annexed the business of fabricating the wool, for its only use was for military clothing and other military uses. The clothing-makers were little more than its manufacturing department, for they were chiefly making what the War Department wanted and making it according to army designs and specifications. If, in this latter period, the army paid too much for its clothing (and

there is no evidence that it did), there is but one place for the allocation of blame.

The control of the wool situation began in July, 1917, when \$25,000,000 was set aside for the purchase of raw material. Prices had risen sixty-five per cent in the first months of 1917 from an already high level, although at that time there was no real shortage. Speculation and the familiar effects of optioning and buying in anticipation of demand had elevated prices. Six million pounds of wool were bought at once and held as a dumping source to keep prices down. In October the Government — through the Quartermaster Department — purchased from the British Government (which had bought the entire Australian clip) 123,500,000 pounds of wool; and, in November, 325,000 bales more, though only 110,000 were delivered. In the same month the War Trade Board put all wool importations under license, with the proviso that no wool should be sold except to manufacturers without permission from the War Industries Board, and further that the Government should have an absolute ten-day option on all consignments and a continuing option on unsold residues. Imports from South America were prohibited.

These measures put the Government in absolute control of imported wool. By exercising its option on the domestic clip, after April 6, 1918, on the basis of the market price of July 31, 1917, plus five per cent, that was thoroughly controlled. Exportations, except those that were to be returned in manufactured form, were forbidden. All of these measures resulted in a total net supply of 656,800,000 pounds of grease wool for 1917 and 503,800,000 pounds for 1918 — as compared with 821,800,000 pounds in 1916. The American production was in the neighborhood of 300,000,000 pounds. In these circumstances the allocation for civilian use was only 25,000,000 pounds in 1918, and was nominally only 15,000,000 for 1919.

To handle the business resulting from the various control and purchase measures, the Government appointed a wool administrator to make purchases, a wool purchasing quartermaster to attend to finances, and a wool distributor to allocate it to manufacturers. It was hoped to augment supplies from

South America in 1919, and the Board's Foreign Mission procured 335,000 bales of Australian wool, but the outlook was so unpromising in general that attention was turned to possible substitutes.

During the war raw materials increased in price two or three times and fabrics from 150 to 200 per cent. Government prices for goods were much lower than the manufacturers could have secured had trade been free, but at that profits were considerably above pre-war averages. Contracts were sometimes awarded without bids, but after the Government got a firm grip on wool there was ordinarily nothing to be gained by departing from the old competitive bidding system — the more especially as there was a surplus of manufacturing capacity. It must be remembered that one reason for dispensing with bids in so much of the Government procurement of supplies during the war was to prevent artificial rises in prices; but, as the woollens situation was shaped, bidding would tend to lower prices.

The handling of the wool and woollens business was necessarily in the hands of the trade. Those men who joined the Government are to be honored for their loyalty to their transformed allegiance, and their fellows with whom they dealt are entitled to great credit for their cordial coöperation. John P. Wood, of Philadelphia, who was chairman of the original coöperative Committee on Woollen Manufactures and later a member of the trade's war service committee, is to be credited in large measure with the high tone of the whole business. He determined at the beginning that honor was more important to the trade than profits from war work, and used all his vast influence to repress rapacity and to see that the Government was never in the dark, deceived, or misinformed in its dealings. If there were any crooks in the business, they could not succeed, because the Government had the benefit of the services of honorable men of superior acumen, who were insistent that the woollen industry should have a spotless war record.

Readers who recall the attempt to stir up a shoddy scandal may question the justice of the recognition herein given to the woollen manufacturers. In truth, there was not the slightest basis of scandal. Aside from some of the early

gap-filling purchases, all Government fabrics were made to comply with rigid specifications — and those specifications called for a certain proportion of shoddy. “Shoddy” is a disreputable adjective, but it is an honorable noun. Shoddy is re-worked wool, and there are many grades and qualities. Ninety-five per cent of the best qualities of civilian overcoats contain a percentage of shoddy. An all-wool overcoat is an expensive luxury, for it is no better and perhaps not as good as a garment containing a proportion of good shoddy. Some sorts of wool actually make a distinctly inferior fabric unless mixed with shoddy. Moreover, most of the shoddy used in Government fabrics was simply the clippings from virgin wool fabrics before they left the factory.

In the beginning, the army specifications called for all-wool overcoats. After the attempt to stir up a scandal because shoddy was found in some of the emergency clothing, General Goethals appointed a commission to fix specifications. This commission reported that the use of shoddy in certain fabrics was not only necessary and essential, but advantageous. A mixed fabric was just as durable, just as warm, and just as good looking. Moreover, if the economy of shoddy had been neglected there would not have been cloth enough to clothe the army, especially as the old specification of sixteen-ounce goods was abandoned and twenty-ounce specified as being more satisfactory for overseas service. The American soldier was the best-clothed soldier in the World War. There was nothing inferior by design or fraud in his equipment. “Army contractor” is no longer a stigmatic term.

In cotton goods there was no problem of scarcity of material, as the United States produces more than half the entire cotton supply of the world. Here the task was one of mobilization and manipulation of the manufacturing industry to meet the immense, and, with reference to the different kinds of mills, unbalanced, Government requirements. During the war the army alone bought 800,000,000 yards of cotton goods. They were required for khaki uniforms, working clothes, duck for tents, webbing, gauze, venetian, sheets, pillow cases, towels, and other purposes.

As with woolen goods, the tendency of the army was to exaggerate its requirements — partly from a laudable desire to provide against the developments of a war that could not be measured by any past experience and partly from the lack of any standards of calculating requirements. Tents, for example, were bought on the theory that there should be one big tent for every eight men, whereas, for the most part, the army at home was in cantonments and billeted in houses or barracks abroad. The first call for tents was three times the normal tentage productive capacity of the country.

The situation demanded the coöperation of the representative men of the industry, and they took hold of it in the same spirit of patriotic service and anti-profiteering that the woolen men did. They started out so strong that they incurred some opposition, but eventually the whole industry came into line. There was not very much enthusiasm for Government business in the early days of the war, as there was plenty of private patronage. So the rather amusing condition arose that the war service committee, without any authority, would be found bullying manufacturers into accepting allocations of Government orders. In the case of the tentage order, for example, mills were actually forced to take orders despite their claims that their machinery was not adapted to the manufacture of duck. The committee knew better.

Again, in the summer of 1917, the army called for 50,000,000 yards for cotton uniforms, which was five times the normal annual production of the goods needed. Forthwith the committee swung over the biggest makers of gingham and fancy colored goods to the making of a cloth they had never touched before. Two such concerns — the Amoskeag Manufacturing Company, and Amory, Browne & Company — came through with 40,000,000 yards.

On top of this army order, the navy turned up unexpectedly with a demand for 5,000,000 yards of the same goods bleached. To meet it mills that were manufacturing for the foreign markets and others that were making sheetings for the domestic market were persuaded to sidetrack everything else and make the navy cloth.

As if that were not enough, the army's Medical Corps,

which was disregarding the advisory committees, called for an enormous quantity of material for pajamas—but the mills that were prepared to make it had already been diverted to army orders; and so the service committee had to do some more vigorous extemporizing. Despite these vagaries of requirements there was never any shortage of equipment due to the failure of the cotton mills to deliver on time.

Speaking of requirements, the Cotton Section was flabbergasted one day by a hot demand for 100,000,000 yards of gauze from the Medical Corps. Consternation reigned until an officer blandly explained that by a trifling error three ciphers had been added to the figure desired.

The big demands came from the Quartermaster Department. It acted through the supply committee, but the navy, the Ordnance, the Medical Corps, and other purchasing agencies insisted on going it alone. The manufacturers hated to do business with the army because it was so slow in paying its bills—but the committee compelled them to come through.

For a time in the fall of 1917 there was very little coördination between the Government and the manufacturers. The informal war service committee that had been acting with Mr. Turner as the go-between was dissolved. Mr. Turner joined the Supply Committee, and then the army took over the whole job. When the War Industries Board got into the saddle again, there was a new war service committee and various sub-committees with which it was articulated.

Prices early developed a runaway tendency and the necessity of firm control soon became evident, but there was no authorized body to deal with the problem until the War Industries Board was thoroughly reconstituted. The Price-Fixing Committee established maximum prices on certain basic fabrics in July, 1918, and additional schedules were issued in the four following months. These were for the public as well as for the Government and the Allied Governments. The matter of fixing prices for raw cotton was often considered, but, as explained in the chapter on prices, the final decision was against doing so. Manufacturers state

that their profits during the war were moderate considering the circumstances, running from twenty to thirty per cent as against a normal ten per cent.

When Lincoln Cromwell, of William Iselin & Co., of New York, was called to the chairmanship of the Supply Subcommittee on Knit Goods, he changed his partnership relations in such a manner that as a member of the firm he had nothing to do with nor could he receive any profits from knitting-mill activities. With his skirts thus cleared in advance, he used his business connections to get the cost-sheets of every mill he could. The members of his committee followed his example and produced their cost-sheets. Then as committeemen, they turned around and did business with all the other manufacturers with the cards on the table. Mr. Cromwell happened to be in such a position that he could divest himself of business affiliations that might be embarrassing, but it was not possible for every big business man in the country to give up his business in order to serve the Government. Indeed, the Government needed them in their business. Certainly, the knit goods men set an admirable example of how to meet a double allegiance. With these low-cost figures before them, the committeemen bullied manufacturers into accepting contracts they did not want at fixed prices for all.

"You can make ten per cent profit," the committee would say, "if you know your business, and if you don't you will have to contribute the rest."

There were some hogs, some red-handed profiteers, and some pro-Germans to deal with in this industry. Then, too, the industry as a whole had a dislike for Government business, because of a widespread belief that through some crooked arrangement a certain firm had got most of the peace-time patronage of the Government. The idea of patriotic service did not take hold at first. It took time to grasp the deeper meanings of war. A group of good American underwear manufacturers who were still infected with the "business-as-usual" doctrine had a meeting at their club and resolved not to accept the price the committee had fixed. One of the men present thought it his duty to inform the committee of the determination of the meeting. So,

when the delegate from the group called on Mr. Cromwell, the latter was prepared.

"We'll take that business at this price," said the delegate, naming his figure.

"Sorry, but we don't need you," said Mr. Cromwell. "When we do, I'll let you know."

However, the delegate hung around the office the whole morning entirely ignored by Mr. Cromwell.

Before he went home, he signed up for a million garments, which compelled the rest of the rebels to take the committee price, while excoriating him for a Judas.

The Knit Goods Section performed the usual commodity section functions in relation to priority matters and the general facilitation of the industry. There were problems of conversion of mills to Government business, of securing supplies of needles, of ascertaining increasing costs with changing conditions, of new machines, of appallingly grotesque requirements and exasperating cancellations. Of course, with the army alone taking 80,000,000 suits of underwear and 90,000,000 socks from the knitters, to say nothing of other goods, the civilian had a hard time of it. He paid through the nose, but the Government, through its control of wool and yarns and its inside knowledge of costs, had the manufacturers at its mercy and held them to the ten per cent profit on low-cost figure. The civilian had to satisfy himself with conservation darning and damming.

The Textiles Division had many grave concerns and heavy burdens beyond woolen and cotton fabrics and knit goods. Felt was a field in which conflicting needs were always tying vexatious knots in a situation that was marked by a desperate shortage. Ask the man in the street what felt is needed for, and he might not get further than bedroom slippers, but the army wanted it for canteens, gas-masks, helmet, hats, caps, clothing, splints, shells, fuse-boxes packing, airplanes, percussion caps, motor trucks; the shipbuilding industry needed it in large quantities and all sorts of machinery clamored for it. There was silk, which was mostly a puzzle of how to provide coarse silk for bags for the propellant power of big guns; flax, which was needed for linen and had to be got from abroad, with the British needing

it all for themselves; jute, hemp, and cordage, which were involved in the nitrate, packing, shipping, and ship-equipping tangles of the ever-entangling war game; and there was kapoc from Japan, for life-preservers; cork from Spain for linoleum, and so on. Conservation and curtailment were resorted to freely.

The story of textiles is one of the great industrial dramas of the war, and in it the big men of the industry played fine parts. More than any other industry, perhaps, the experience of its manipulation for Government purposes reveals the soundness of the original Raw Materials Committee idea of making contacts between business men in industry. With all the control its monopoly of wool and its domination of demand gave the army — and even with the aid of supply committeemen taken into its procurement branch — it found that it had to fall back on the War Industries Board and its commodities sections for that efficiency of articulation which is summed up in good management.

CHAPTER XXVIII

THE IMPLEMENTS OF WAR BEHIND THE LINES

Quantity production in a machine-made war — No grinding machines, no airplanes — Reducing standardization fever — One of the industrial heartbreaks — Anchor chains for merchant ships.

A MAN and a machine are equal to thirty men. Hence the magnitude of modern war. The ancient wars were fed by supplies produced by slave-power — a power virtually without means of multiplying itself. The wars of the feudal age were measured by the productive powers of serfs with rude tools and of artisans without machinery. The wars of our time are sustained by machines which do not depend on human energy and muscular strength, but on the genii of steam, electricity, and gas which science has summoned from their repose of ages.

When Cæsar went to war, the slaves went to work; when the knights of the crusades set out for battle, the humble craftsmen hammered and sawed. Neither slaves nor commonalty could be made to order. When the moderns war, they call on the machines and provide more machines. Measured by machine-making capacity, the war-power of the United States at the end of 1918 was two and a half times that of Germany and ten times that of England — and war was taking nine tenths of the American product.

The demand for machines with which to make war machines and products — that is, tool machines — had multiplied the American producing capacity four or five times in eighteen months. It takes anywhere from a month to nine months to make a machine tool — which explains why America seemed to be slow in getting into production of the goods and implements of war. All the orders given by the war-making agencies bred requirements for machine tools, and thus in the end came back on the machine tool industry. In the case of some war implements, such as airplanes, the manufacture of which was previously non-existent in this country, the entire machinery equipment of all the plants set

to the task had to be built from the ground up — thousands of elaborate machines for each plant, and hundreds of thousands of tool attachments. In this quantity-production country everything goes back to machine tools and their making.

The Air Service, for example, required 125,000 different articles for its equipment — and probably every one of them had its origin in machine tools — tools that had to be made in thousands of instances.

The task of providing machine tools would have been overtaxing at best, but when it is added that seventy-five per cent of the industry was in that maelstrom of the congested region of the northeastern section of the country, where the shortage of fuel, transportation, and power confronted a cloudburst of orders, the job became so stupendous as to appall the stoutest heart.

Fortunately, the number of makers was relatively small — about four hundred — and the majority of the machines required were standardized. This made it possible for the Machine Tool Section to keep track of orders, production, and delivery in a remarkably complete way by means of a card system. The section was thus currently informed of every order every manufacturer had received. The manufacturers kept duplicate cards. By means of these cards, which normally recorded twenty thousand orders, the section could determine when delivery could be made on a new order of a certain grade of priority and what unfilled orders would be interfered with by the priority assigned to the new order. Thus, a remarkable degree of coincidence of delivery with time estimates was attained.

The cards gave the Priorities Committee the basis of shifting priority and also of determining the need of priority for fuel, materials, and labor. Notwithstanding a great shortage of labor and materials, the industry was in a position at the end of the war to have extended even more assistance to the Allies than it had been giving, besides taking care of all of our Government's requirements.

Owing to the fact that war requirements bore more heavily on some lines of machines than on others,¹ George E. Merry-

¹Mr. Merryweather's assistants were: Alvin B. Einig, Arthur J. M. Baker, Roland Houck, Ernest D. Crockett, Floyd C. Lowell, Walter L. Dittforth.

weather, the chief of this section, had to resort to a diversity of conversions and adaptations. Plants that had not been making a certain tool at all got jigs and fixtures and patterns from plants that had been. Manufacturers of water wheels turned to lathes; one printing-press manufacturer made slot-terers; another made milling machines and lathes. Owing to the suspension of building operations, several hundred stone planers were idle, and they were turned to certain rough operations in ordnance work.

On one occasion, Colonel E. A. Deeds, who was then chief of the Equipment Section of the Aircraft Production Division, informed Howard E. Coffin, chairman of the Aircraft Production Board, that the whole aviation programme was blocked because of the lack of cylinder-grinding machines. The only manufacturer was threatened with a strike, his superintendents had quit, and his plant was demoralized. There was one other concern which had made such machines, but it was gorged with other A-1 priority work. Mr. Merryweather instantly called up a manufacturer in another line that was not essential. This man went to the full-up plant, got their patterns and drawings, came to Washington the next day, got an order for fifty machines, and was soon turning them out.

The machine tool emergency was met to a material degree in the first part of the war by commandeering machine tools made for export which, owing to shipping difficulties and other reasons, had been lying on the docks for months and years. The Ford Motor Company was thus provided with airplane cylinder grinding machines on twenty-four hours' notice.

One of the biggest things Mr. Merryweather did was to kill a general standardization suggestion that was evolved in the War Department during an attack of unusually severe standardization fever. To have reduced all machine tools to uniform standards would have stifled production for many months.

Owing to the length of time required for the production of machine tools, the inability of the army to forecast requirements caused more trouble here, perhaps, than the lack of comprehension of requirements in any other line. The navy,

as in most requirement matters, functioned better than the army owing to its superior pre-war organization and to the comparative simplicity and smallness of its needs.

Despite all of Mr. Merryweather's efforts to look ahead, his section was continually confronted with insistent calls for machines that had been overlooked or were demanded by some unforeseen and, possibly, unforeseeable development. His task was lightened by the cheerful and intelligent coöperation of the industry, which not only made the machines, but contributed its engineering knowledge and experience freely to the section and to the various procurement agencies. Sometimes the industry had to design or choose machines before the army officers could get to the stage of knowing what to order; as, for instance, in the machine production in this country of the carriage of the French 75 mm. guns, it required fifteen or twenty experts of the industry to figure out what kind of machines and how many would be needed.

All of the things that have been mentioned give but a slender conception of the magnitude, difficulty, and complexity of the work of the Machine Tool Section. And that is true of almost all of the sections of the War Industries Board. Multiply the problems and deeds of one section by sixty, and one gets his imagination primed for a hazy conception of what the War Industries Board had to do and did do.

One of the industrial heartbreaks of the war was in the manufacture of cranes. Because of some blunder or failure of coördination, a great battery of sixty huge gantry cranes, planned with amazing prevision and built with wonderful dispatch — intended for the equipment of the vast wharves, piers, and docks the A.E.F. had to erect in France in order to make it possible to land millions of men and their enormous equipment and mountainous supplies — lay for eight months at the seacoast on this side of the Atlantic. Yet each of these cranes meant five or more days saved in the unloading of a vessel — and those five days were equivalent to an increase of fifteen per cent of tonnage.

Engineers of the crane-making companies went to France with the army engineers and worked in such close touch with them in planning the port bases that the plants in this country

were ready to start on production full-speed ahead the moment they got the word. The cranes were turned out with a speed that was the amazement of the builders themselves and, in coöperation with the Engineer Corps of the army, which lived up to its reputation for efficiency and celerity, crews of civilian erectors were dispatched to France to set the cranes up with all possible speed.

Then came the tragic climax. Somebody on the other side had disregarded the engineers on this side and had built docks that could not sustain the great gantry cranes, having made up his mind that cheaper temporary construction and improvised unloading contrivances would fill the bill. It was one of the most costly errors of the war, as well as inexpressibly agonizing to the section, the engineers and manufacturers.

Somehow, two or three of these cranes did get across, and being there some one decided to strengthen a dock and put them up. When they got into action, the improvised cranes and derricks looked like a horse express wagon alongside an eight-ton truck. Immediately a shout came back from France for the rest of the ordered cranes and twelve more. But eight months of critical time had been lost.

The way the Crane Section dealt with that tragic consignment for France was typical of its performance throughout the war. In its head, Alexander C. Brown, the War Industries Board had a man who had the confidence of the industry and it followed his lead with enthusiasm. Primarily organized to handle locomotive cranes, which the Emergency Fleet Corporation needed in great numbers for the shipyards, the section came to look after other shipbuilding cranes, coal-handling machinery of all kinds, and overhead electric traveling cranes.

Between the Fleet Corporation, the Railroad Administration, the Engineers, the Ordnance, the Quartermaster Department, Aircraft Production, and the Allies, the section was soon confronted with an insistent demand for hundreds of cranes. These were carefully allocated with respect to urgency among the existing plants and then steam-shovel builders and other allied lines of industry were called into the conversion breach. The number of locomotive crane-

builders was thus increased from seven to eighteen, and by October, 1918, the output of the great lifters and conveyors, of standard and special designs, had been pushed up from fifty to three hundred and eighty a month, thus providing the colossal construction and manufacturing plants and transport evoked by the war, with giant hands and arms of fitting might.

Chains — even the big anchor chains — would seem to be a small thing in a big war programme. But they were not. Despite all that was done by the Chain Section¹ and the Emergency Fleet Corporation, anchor chains could not be forged fast enough to keep up with the demands of the impressive column of merchant ships that left the ways at the rate of four or five a day when American energy got its bearings in the war-enforced revival of the shipbuilding industry. In the midst of the ship famine, completed ships could not sail for lack of anchor chains. Despite all efforts the chain-makers never did catch up with the shipbuilders; the handicap was too great.

Nobody could have foreseen, in the winter of 1917, that within a year America would be producing more ship tonnage a week than it had formerly turned out in a year. To meet the emergency, cast steel chains were conceived, but the armistice came before they got into production.²

The Hardware and Hand Tools Section had some interesting experiences. It came into contact with a curious phase of the incidence of priority. Many concerns within the province of the section, which were among the industries that had been curtailed, fearing that their low priority standing would result in shut-down, came to Washington and got Government contracts at any price in order to get a better priority rating. The practice threatened to upset the whole priority scheme, but, whether it would have resulted in the Board's substituting suspension for curtailment in the offending industries, or a modification of priority administration to meet this attack by infiltration, was not determined before the armistice threw

¹John C. Schmidt, chief.

²Many of the problems relating to machinery were the concern of the Resources and Conversion Section, dealt with in Chapter XII; and the section on forgings, ordnance, small arms, and ammunition discussed in the same chapter.

the problem into the scrap-heap. The section had to do with fourteen of these rationed industrial groups, and the progress of the war had, for them, turned a feast into a famine. With the despair of hunger they fought for means of sustenance.

On the side of shortages, the manufacture of needles gave the section the most concern, as the United States had left them mostly to Germany and England. A shortage in saddlery hardware started prices ballooning, but was met without price-fixing. Ships' hardware was another shortage problem. Carrying the trade coöperation idea of the Board to the *reductio-ad-absurdum* limit, the manufacturers of horse-shoes, and also the manufacturers of hydrants and valves, created tight monopolies and insisted on dealing with the Government as units, refusing to make bids or otherwise deal individually, though there was no shortage of their products. The error of their ways was pointed out to them, and moral suasion, and, perhaps, the shadow of the anti-trust laws, caused them to break up their unity. After the metal bed manufacturers had been curtailed fifty per cent, the influenza epidemic set in — and there were not enough beds. The manufacture of toxic gas crowded the manufacture of fire extinguishers out of their supply of tetrachloride — and so fire extinguishers were scarce and costly.

And so with this section, as with most of the others, it was one problem after another; the solution of one often breeding others.

CHAPTER XXIX

POWER AND TRANSPORTATION AS FIGHTING FACTORS

The power-fuel problem — Conserving electrical power in congested centers —
The riddle of steam turbines — Automotive engineers in the war game —
Creating the heavy-duty truck — Nine thousand locomotives demanded.

IN the cycles of war all things depend on power and transportation. Amputate a piece of a straight line, and you still have a straight line left. Take a sector out of a circle, and you have nothing. In the World War, cause and effect pursued each other around circles until it was impossible to determine their primary identities. Power and transportation loomed large in these vicious circles and were entitled to respectful consideration for their claims that they were the primary factors. With equal propriety innumerable other factors could put forward a similar contention. They were all right; a circle exists only as a whole.

In the larger sense transportation was lodged in the Railroad Administration and in the Shipping Board and its tremendous Emergency Fleet Corporation. In like manner power was primarily in the hands of the Fuel Administration, for fuel oil, gas, and coal are power. The complete history of power and transportation in the war would, therefore, include a narrative of those three administrations. In a previous chapter rather full mention was made of the close articulation of the Railroad Administration and the War Industries Board, whereby the former functioned for the purposes of the latter just as directly and immediately as if it had been a subsidiary.

The coöperation of the Fuel Administration has been often noticed, but perhaps it has not been given the emphasis it is entitled to. The War Industries Board encountered the power-fuel problem at every turn, and its full mastery was essential to the application of the all-powerful lever of pri-

ority. A conflict or serious friction between the administrations of industries and of fuel would have been catastrophic. Fortunately, there was the fullest and most unselfish partnership between the two. For all its purposes the War Industries Board could at all times count on the Fuel Administration as certainly as on one of its own divisions or sections.

McAdoo and Garfield were constant and potent allies of Baruch. Chairman Hurley, of the Shipping Board, was more a law unto himself. The Shipping Board was never knitted into the fabric of the War Industries Board as were fuel and the railways. It coöperated, but it did not amalgamate.

Power came directly under the sway of the War Industries Board in the electrical form, whether derived from fuel or water power; for in this form it was a commodity of well-defined sources with many consumers, whereas steam power was essentially an integral part of each industrial unit, and, therefore, essentially a matter of fuel, except on the side of generating instrumentalities. In hydro-electric power the Power Section, of which Frederick Darlington was chief, had to do with both the distribution of power and the problems and machinery of its generation. But the administration was a rather complex one, being really three- and even four-sided.

Charles K. Foster, who was vice-chairman of the Priorities Committee and represented Judge Parker on the Priority Board when the latter was absent, was specially charged with all priority and requirement matters relating to power, in a manner and degree that made him an active manager as well as an arbitrator of priorities. Then, power matters involving new construction had to be cleared through the Facilities Division. Finally, the Army Engineer Corps was responsible for studies, surveys and investigations, and recommendations, and the staff of regular and temporary engineer officers delegated to this task acted also in a large degree in an executive capacity for the section.

General Charles Keller, United States Engineers, was in charge of the engineering aspect, and he and R. J. Bulkley, who was chairman of the legal committee of the War Industries Board, and C. B. Davis acted as associates of Mr.

Darlington's, Captain W. W. Stanley, of the army, being executive assistant. Percy H. Thomas, a New York engineer, acted as special consultant. All of this sounds rather complicated, but the combination, which appears to have combined the values of military prestige and authority with those of civilian tact and adaptability, worked very harmoniously and effectively. The Power Section proper was not established until December, 1917, although Mr. Darlington had been previously acting as consulting engineer in power matters.

The section, among other things, advised the Capital Issues Committee when application to that committee for authority to issue securities concerned power projects, and also the War Finance Corporation in regard to loans of a like nature. It also acted in close touch with the Electrical and Power Equipment Section, of which Walter Robbins was chief.

The shortage of electrical power in some of the congested centers, such as Pittsburgh, Buffalo and Niagara Falls, Philadelphia, Akron, Ohio, New Jersey, and a number of places in the South and elsewhere, became alarming in the fall of 1917 and the winter of 1917-18, and it became necessary to apply the priority principle very strictly, rationing and even withdrawing all power from some non-war industries.

Ice, drought, low water, coal shortage, and congestion of transportation battered at the citadels of power and made many an ominous breach. In Pittsburgh, conservation of power was carried so far that electrical heating was denied to street cars, and the whole eastern half of the country endured the famous five heatless and lightless days which caused localized outbursts of popular rage.

Had the war not interfered with the normal development of power plants, perhaps there would have been enough power in all the congested centers; but, as it was, it became the duty of the section and the interested departments — the Shipping Board, the War and Navy Departments — to develop additional power. As private development under war conditions of a degree of power that might not be needed for some time under normal conditions was out of the question, it was necessary for the Government to undertake the

work. It was, therefore, arranged that the War Department would finance extensions in the Pittsburgh district, the navy in New Jersey, and the Emergency Fleet Corporation in Philadelphia. None of the extensions, of any consequence, was completed during the war; though much was effected by conservation and inter-connection of electric power systems. The studies and surveys were very comprehensive and exhaustive, and a plan of massing and consolidating electric power facilities in different sections into power pools was worked out; which has been and will be of much value to industry.¹

While Government intervention did not result in much increase of public utility power, it was of the greatest value in maintaining the existing power and making the most of it. In Pittsburgh, for example, there was dire danger of a total breakdown of the Duquesne and West Penn plants because of overuse and deterioration. Effective steps to make repairs and prevent overstrain were taken at once. Despite all that could be done, the power shortage in the Pittsburgh district in 1918 was not less than 130,000 kilowatts.

At the Niagara power center there were international as well as shortage complications to deal with, but, with cordial Canadian coöperation, curtailments, and economies, it was possible to make shift to provide the imperatively needed power. Besides the reinforcement and supplementation of existing power service plants, there were large problems of furnishing power for the great Government explosives plants at Nitro, Nashville, and elsewhere, and the nitrate plants in Alabama. In the latter connection, it was fortunate that the retarded development of electrical power generation had left considerable machinery in the hands of the manufacturers

¹General Keller's *Report on the Power Situation During the War* (Government Printing Office, Washington, D.C.) is a volume of the greatest importance for engineers, manufacturers, economists, and all who are attracted by the great problems of efficient and economical production. It is really a presentation of the present power problems of the Nation, and shows how greatly the war industrial productive capacity of the country was handicapped by lack of power. Had there been some such agency as an industrial strategy board at work before the war, the fundamental importance of power would have been appreciated in time to have effected needed expansions even during the short term of our participation in the war. As it was, the capacity of plants dependent on electrical power was increased out of all proportion to the power.

— especially the Westinghouse and General Electric Companies — which could be taken over. This completed or partly completed generating machinery had a capacity of one million kilowatts — enough power to move the world, as one manufacturer put it, but it was only enough for the growth of demand in one year under war conditions.

After all, the greatest saver of the situation was the diversion of business from the congested districts. The surveys showed exactly what districts must be relieved and what could take on more power. This, in connection with other reasons for the diversion and diffusion of war industry, would have effected great redistributions of industrial activity had the war continued another year. Although the subject does not lend itself to vivid narrative within a limited space, there was no other department of the industrial war forces which received such comprehensive and fundamental examination and such adequate preparation for future contingencies.

In an incidental and illustrative way the work of the Wire Section, headed by Le Roy Clark, has been referred to already.¹

The Electric and Power Section, of which Walter Robbins became chief in November, 1917, had little trouble with electrical supplies, but great shortages developed in apparatus, as is evidenced by the fact that before automatic priority ratings were introduced, the section received as many as 300 priority applications a day and to a total of 29,000. Besides committees in other lines, the section enjoyed the assistance of a general war service committee of the electrical industry, and of twenty-four war service sub-committees in electrical supplies, and eleven in apparatus, also a jobbers' committee; the unusual number of which is an index of the variety and complexity of its duties and functions.

One of the greatest problems of the section was that of steam turbines, which were in demand by the navy, the Emergency Fleet, the army, and private companies. The chief obstacles here were not only the great, new production demanded for marine uses — hundreds of the new ships being turbine-driven — and the enormous demand for tur-

¹See Chapter VI.

bines and other steam engines for the generating of electrical power, but the fact that it required seven to twenty-four months to make the land types. It was finally necessary to make steam turbine production a controlled industry.

Although in the summer of 1918 there was an indicated demand for steam boilers in excess of 7,000,000 horse power, orders for which had been placed chiefly with six companies, all essential demands were being met substantially on time when the war ended. Old boilers were brought into use, and even the boilers of antiquated locomotives were fitted to stationary engines. Space does not suffice for an account of the voluminous and intricate relations of the section with conveying apparatus, fans and blowers, automatic mechanical stokers, small engines and turbines, transmissions, superheaters, and economizers, feed-water heaters and hot-water generators, fabricated piping, condensers, steam engines, pumps, compressors, hydraulic turbines, saw-mill machinery, mining machinery, public utility equipment, internal combustion engines, and miscellaneous machinery. The mere list of apparatus, however, illuminates the great scope of the section's work.

When it is considered that priority, conservation, and allocation were involved in connection with all of them, the magnitude of the section's duties may be glimpsed. Back to it came, in a word, all the problems of supplying power machinery for the thousands of new war plants and extensions for all the vast and heterogeneous war industries; for the three thousand ships of the new merchant fleet, for the new naval vessels, for the great power plants of the A.E.F.; and the mechanical power of the Allies, to a noteworthy extent.

The general relations of the automotive industry with the War Industries Board have been presented in the chapter devoted to the Steel Section and in Chapter X. It will be recalled that the industry was restricted to the production of half of its normal output for the latter half of 1918. In accordance with this arrangement, the Automotive Products Section, of which Charles C. Hanch was then chief, certified to the Steel Division the requirements of ninety-

five manufacturers for material needed for the production of 295,468 passenger cars. The industry was supervised through monthly reports from each manufacturer, but all restrictions were removed before the end of November. The manufacturers of parts were also rationed under a permit system which aimed at allowing each plant to purchase enough material to keep it going for from sixty to ninety days on a fifty-per-cent production basis. The manufacture of motor-trucks was considered as a preferred industry, and was supervised only to the extent of assisting it to meet its Government orders and to exclude the production of trucks for non-essential uses. The latter was accomplished through pledges, on the observance of which priority of fuel and steel and other materials was conditioned, and on monthly reports.

The positive work of the section was extensive. Within its jurisdiction was not only the automobile industry proper, but other forms of production in which the industry was engaged, such as airplane engines and bodies, tanks, marine gas engines, armored cars, motor-cycles and bicycles.

It must not be forgotten that the automobile industry supplied the lion's share of the engineering talent, skilled workmen, and executive direction, as well as production, of the major part of the great aircraft programme. Its record in this strenuous endeavor was most creditable and abounds with instances of remarkable feats of engineering and production. Of Liberty engines alone it was producing 150 a day at the end of the war, and had completed 16,000.

The automobile industry shared in the obloquy which fell to the Aircraft Production Bureau, but all well-informed persons now understand that its war service in that respect was extraordinary and even heroic, and that the Bureau itself discharged its unprecedented and unknown task in a manner which at the least justifies cool and impartial scrutiny.¹ To be sure, the Aircraft Production Board, headed by Howard E. Coffin, and the later Aircraft Board, and the

¹*Wings of War: An Account of the Important Contribution of the United States to Aircraft Invention, Engineering, Development, and Production during the World War*, by Theodore M. Knappen (G. P. Putnam's Sons, New York), gives many essential facts.

Aircraft Production Bureau took a large share of the field that would otherwise have been that of the Automotive Products Section; but, nevertheless, the section performed a vital service because of the way in which supply, priority, and coördinative functions came gradually to make the War Industries Board the energizing center of all things pertaining to industry. The automotive industries had war contracts outside of their normal lines that amounted to about a billion dollars, and which were of such volume as to react deeply on the whole industrial complex.

Historically, this section goes back to Mr. Coffin's division of the affairs of the Advisory Commission of the Council of National Defense. Mr. Coffin, whose vision regarding motor transport in war was as far-seeing as his perception of the need of industrial preparation for war and of the importance of aircraft, early caused to be appointed a committee on automotive transport, with Karl W. Zimmerschied, of the General Motors Company, as vice-chairman. With the passing of the Council committees, the work was taken up by the section. H. L. Horning was its chief, and he was assisted by H. J. Adams and advised by Coker F. Clarkson, secretary and general manager of the Society of Automotive Engineers, who was also in the work from the beginning. In the final form the section was headed by Mr. Hanch, the other members being representatives of six governmental agencies.

The chief creative work of the committee and the intermediate stage of the section was the development of a standardized heavy-duty truck, which grew out of army specifications, based on experience in the Mexican affairs crisis. From specifications of parts the undertaking grew into the designing of a standard heavy-duty truck. Through the aid of the Society of Automotive Engineers, one of the most prominent and energetic engineering bodies of the world, a group of fifty engineers was selected by the Quartermaster Corps to design such a truck; and a sub-committee of the section was created to advise with the Quartermaster Corps regarding the organization and policies to be followed in production.

The new truck was created with extraordinary celerity.

Though the drawings were not begun until September 1, 1917, two trucks started on trial trips from Lima, Ohio, and Rochester, New York on October 10, 1917, and arrived in Washington on the 14th. By July 1, 1918, 5000 trucks of this type had been completed and 13,000 more were under order. There were also four other general types of army design of trucks. The requirements of trucks and passenger cars for the Government up to July, 1919, were 308,080, and more than 84,000 had been completed on October 10, 1918. Of motor-cycles and bicycles, the requirements were 188,358 and 40,319 had been completed.

While the heavy-duty truck was admirable, it was found impossible to push its production to the maximum without interfering with that of the ordinary trucks and with a net loss in total truck production capacity, which despite all efforts seemed certain to fall short of the needs of an army of eighty divisions. The complications involved in the supply of parts and materials for the favored army designs were enormous, to say nothing of the planning and scheming to bring up production of other trucks. The section was kept on tiptoe with problems of allocation, conservation, priority, and the origination of new sources of parts. There is little doubt that, notwithstanding the timid reluctance of manufacturers to retire from the manufacture of passenger cars except for war uses, the industry would have been taxed to the limit had the war continued to meet the truck, airplane, tank, balloon, tractor, lighting plant, recoil mechanisms, naval gun mount, artillery wheels, caissons, Eagle boats, depth-bombs, gas engines, and miscellaneous demands that were made upon it. That the industry met successfully so many other war demands at the same time that its production of aeronautical engines and airplanes and balloons was alone sufficient to strain its resources is a sufficient vindication of the judgment of those who relied on it.

While rail transportation was solely the business of the Railroad Administration, it had to operate in conjunction with the War Industries Board for all manner of supplies and equipment. Pertinent to this chapter was the demand

for locomotives and cars—not only from the American railways but from the Allies, certain neutral countries, the A.E.F., Government plants, and industry in general. Originally rolling stock was looked after by the Advisory Committee on Plants and Munitions, but in midsummer, 1918, it was necessary to set up a Section of Railway Equipment and Supplies, of which J. Rogers Flannery was chief.

It was characteristic of the supply organization of the Board that, whereas the other sections considered in this chapter, as well as those dealt with in the preceding chapter, were grouped under Mr. Peek in the general Division of Finished Products, Mr. Flannery's section was considered better placed under Mr. Legge¹—probably because of the international phase of the subject-matter. The priority side of the subject was the special concern of T. C. Powell, vice-president of the Southern Railway, who was a member of the Priorities Committee and the Requirements Division and the general representative of the Railroad Administration with the War Industries Board; though Edward Chambers, director of traffic of the Railroad Administration, was a member of the Priorities Board. Mr. Powell,² it should be said, rendered remarkable service in the manifold duties that thus devolved upon him.

Mr. Flannery had been associated with Mr. Davison in the Red Cross at the beginning of the war, and before coming to the War Industries Board had organized the extensive housing activities of the Emergency Fleet Corporation. One

¹The reader is reminded that no attempt has been made to follow closely the administrative groupings of the sections of the Board in the sequence of subjects considered in this work.

²Mr. Powell was vice-president of the Southern Railway. His assistants in the Transportation Division of the priorities work were, at various times, J. P. Houston, H. S. Adler, and J. L. White (chief clerk of the Priorities Division), H. F. Bell, H. W. Hawley, and G. F. Buell. The Transportation Division eventually controlled priority in transportation, but it was more than that, being in fact the active administrator of railway traffic on behalf of the War Industries Board. As Mr. Powell always had the Railroad Administration solidly behind him, and that administration had separate traffic departments for the War Department, Navy Department, Fuel Administration, Food Administration, and the Emergency Fleet Corporation, the whole direction of traffic for Government purposes was tied into his office. In this way the War Industries Board had a direct and wide authority in shaping, directing, and expediting railway traffic throughout the country.

of the first things he did was to call a meeting of locomotive-builders and representatives of interested Government departments to deal with the demand for nine thousand locomotives in the following eighteen months. There are only three builders of regular railway engines in the United States, and there was no possibility of their meeting the demand without great enlargements of plants, which would take so long as to be impracticable. The best that could be done was to emphasize repairs and rejuvenescence of old locomotives and speed up production by concentration of types in the three plants. The Baldwin Locomotive Works took the military engines, and the American and Lima companies concentrated on Railroad Administration machines. The Allies got whatever engines the A.E.F. could spare them, but the Italian roads were too frail for the "Pershing" type, and they had to be taken care of at the Montreal, Canada, plant of the American company.

The difficulty in supplying freight cars was just as great, and called for all sorts of shifts, substitutions, and special aids. The Railroad Administration needed 100,000, the Military Railways demanded 30,000, and then 41,000 more standard-gauge cars and 4000 narrow gauges. The heavy demand for small locomotives for narrow-gauge railways at the front and elsewhere was entirely diverted from the three big companies to the makers of mining and industrial plant engines.

A sidelight on one of the hundreds of facets of the section's work is afforded by the outcome of an order of one of the Allies for railway equipment. Its agents had practically closed the deal when they came to Mr. Flannery for approval. He saw that they were being gouged; reopened the transaction, and saved them \$4,000,000. This incident is indicative of the enormous savings the War Industries Board was the means of making in the thousands of orders it revised.

In the seething caldron of the times, power and transport instrumentalities held an almost desperate post — but they held it nobly.

CHAPTER XXX

THEY ALSO FOUGHT

Begging, borrowing, commandeering optical glass—A new-born industry—Surgical needles, aspirin, artificial eyes, and soldiers' beds—Tobacco for the doughboy—Saluting the commodity sections.

WHEN, in August, 1914, Germany struck for world hegemony, she not only had a virtual monopoly of the dynamic weapons of modern war in her highly developed chemical industries; but, among other initial advantages, she was supreme in the vision of the battle-field—in optics applied to war. This was not the outcome of military prescience on her part, but of her supremacy in the manufacture of optical instruments and her monopoly of the knowledge and the means of production of optical glass. The Allies, in the creation and mobilization of armies and fleets of unprecedented magnitude, were compelled to beg, borrow, and commandeer every sort of instrument that contained a magnifying glass.

Although the isolation of Germany had resulted in the stimulation of the manufacture of optical instruments in this country and elsewhere, and even in the production of some optical glass, the United States found itself, in 1917, in about the same precarious position that the Allies occupied in 1914. Large quantities of instruments were needed for field use by the army, for military photography, artillery fire-control devices; naval and merchant shipping, and microscopic uses; moving-picture cameras and projectors, ordinary photographic purposes, etc.

The two greatest obstacles to rapid expansion of the infant American industry to meet the crisis were the lack of optical glass and of men who had been trained in the delicate art of grinding precision optics. In the production of optical glass, the chief difficulty was that the formulas were German secrets. It was necessary to determine formulas by tedious and laborious research and experimentation; and when they had been worked out, there remained tough practical problems of successful manufacture in quantities.

The versatile Federal Bureau of Standards threw itself into the breach, and its brilliant technicians, working with the Bausch & Lomb Optical Company, the Pittsburgh Plate Glass Company, and the Spencer Lens Company, had arrived at the production of a small quantity of glass before the War Industries Board intervened; and a new company, the Keuffel & Esser Company, of Hoboken, New Jersey, had entered the field.

By March, 1918, the shortage of optical glass was so severe that it became necessary to organize a section of the Board to deal primarily with the problem of quantitative production. George E. Chatillon, of John Chatillon & Sons, New York, became the chief, and Major Fred E. Wright represented the army, and Commander W. R. Van Auken, the navy. The Geophysical Laboratory and the Bureau of Standards were appealed to, and the former sent a technical staff to the assistance of Bausch & Lomb Company, with the result that a number of scientific problems were solved and optical glass was produced in commercial quantities. Professor Bleininger, of the Bureau of Standards, conquered the problem of making suitable melting-pots, and thereafter the Pittsburgh Plate Glass Company became the largest producer of optical glass.

The Spencer Lens Company received a contract for lenses which necessitated the erection of a glass-making plant. Dr. Morey, of the Geophysical Laboratory, went to their assistance and improved processes to such a degree that the number of hours needed to make glass was reduced from forty to twenty-four. The quality was excellent. Thereafter the optical instrument problem was one of precision grinding and of suitable labor. The whole industry was taken under control by the section, and the glass was allocated as produced and labor forbidden to shift from plant to plant. Before the end of 1918 the new-born industry was prepared to meet all future requirements and had accepted orders from the army amounting to \$50,000,000 and from the navy of \$15,000,000. Not only that, but the United States was made independent of foreign sources for all time.

It was one of the great victories of the war as fought behind the lines.

The work of the Section of Medical Industry historically connects the War Industries Board with the General Medical Board of the Council of National Defense and the Medical Section of the Advisory Commission, headed by Dr. Franklin Martin. It was carried on in the original form until May 31, 1918. The section was then established with Lieutenant-Colonel F. F. Simpson, chief.¹ The section was assisted by an advisory board on medicinal agents and by war service committees of the interested industries, which replaced the old coöperative committees. One of its most pressing problems was that of originating the manufacture of surgical needles in this country, as previously they had come from England, and that country could no longer supply more than a fifteenth part of American requirements. All surgical instruments were scarce, and there was a shortage in some of the synthetic drugs.

In order to conserve productive capacity, products were standardized and reduced and the catalogue of articles was reduced from 1100 to 51 pages. Substitutes for such local anæsthetics as cocaine and novocaine were produced and a number of factories making the articles were induced to take up the manufacture of surgical instruments. The growing of drug-producing plants was stimulated through the Department of Agriculture.

The huge realignment of all industry incident to the supreme war effort worked some curious consequences to medicine and surgery. When the country was divided by the Food Administration into beet-sugar and cane-sugar zones, it was discovered that beet sugar was not adaptable to medicinal purposes, and the corresponding adjustments had to be made. When the influenza epidemic came on, the Research Council took up the production of aspirin. The patent had expired, but the Bayer Company claimed the name. Also production had been curtailed because one of its ingredients was in great demand for airplane dope.

Despite the enormous production of industrial chemicals used in medicines, the latter were often on the verge of being excluded from their relatively small requirements. There

¹David L. Kean was assigned to surgical instruments and hospital furniture and equipment; A. G. Rosengarten to medical chemicals.

were not enough artificial eyes, and maimed civilians had to wear eye-laps to let the wounded fighters have the eyes. The shortage of steel made it advisable to substitute wood for iron in bed-frames for cantonments, camps, and industrial housing, and the Field Medical Supply Corps called for two hundred thousand wooden bedside tables. The Army Medical Department objected on sanitary grounds to both beds and tables, but Judge Parker ruled in favor of the wooden substitutes. Nevertheless, the matter was still in abeyance when the armistice came.

These were only a few of the section's concerns, which included all of the duties customarily performed by the various sections of the Board. Price-fixing was not attempted, although there were some tremendous advances in prices, as it was felt that high prices were stimulative of production. Acetiphenetidin, for example, which sold at 84 cents a pound in 1914, jumped to \$42 in 1916, but got down to \$2.75 after American manufacturers took it up. The average price of medicinals at the end of the war was about 320 per cent of normal.

Tobacco may not be ranked as one of the indispensables of life, but in these times a smokeless army would be a fightless one. If it be considered one of the essential materials of military preparation, the United States could carry on forever under a water-tight blockade. There was really no shortage of tobacco in its various forms at any time during the war, though a larger proportion of the soldiers and sailors smoked when in the ranks than when at home and their average individual consumption was seventy-five per cent greater. The Quartermaster Department calculated that each soldier would consume two pounds of chewing and smoking tobacco a month and one pound of cigars and cigarettes. Whether this was an overestimate, or whether it was multiplied by too large a number of phantom soldiers, the situation was jammed into an apparent shortage, which disappeared when requirements were revised, although temporary inconvenience was caused by overbuying while the erroneous estimates prevailed.

The general situation was so easy in the first part of the

war that it was well into 1918 before it appeared to be necessary for the Board to establish the Tobacco Section, of which Alfred I. Esberg was chief. The work of the section was largely devoted to gathering information with a view to preparing for a possible emergency. The subject of price control was being examined as the end of the war approached.

Aside from the sections concerned exclusively with the internal administration of the War Industries Board, the work of all the sections has now been reviewed, though but scantily and inadequately in many instances. With rare exceptions, the sections acquitted themselves in their numerous duties with a degree of efficiency that would have been considered extraordinary even in private business. They established a standard of excellence in government that will be forever the despair of bureaucracies. They injected business into government and government into business to the benefit of both. Perhaps, in the course of the slow evolution of politics and economics and their inevitably progressive blending, we may come some day to a general form of government analogous to the War Industries Board's brilliant conception and practice of government by commodities. Since its essence is simply the juxtaposition of experts and specialists representing the collective interests of the people on the one hand and the special interests on the other, it requires no great stretch of the imagination to see it become fundamental in a world that becomes more and more industrial and less and less political.

CHAPTER XXXI

APPRAISAL — WITH A FEW COMMENTS ON PUBLIC ADMINISTRATION

The unsung men in mufti — Dropping the reins of power — Democracy and decision joined — Private life *versus* public life — A panorama of the task and the achievement — The philosophy of priority — The trend toward general control — The Board reaches its zenith — Lessons for another war — Industrial aftermath — Industrial strategy, in war and peace — The curtain rings down — The Board becomes history — Its organism in perspective — Industrial democracy vindicated.

DESPITE the fact that all great captains have had great quartermasters and commissaries, little is recorded of them in history. The marvel of Xerxes' invasion of Greece was, not that it did not succeed, but that the host of a million men that carried it so far from its base was supplied with arms and provisions for so long a time. Yet history omits to mention the business manager of the expedition that failed in battle at Marathon. Little more do we know of the supply of Alexander from the Mediterranean to the Indus, of the Roman wars, or of the Saracenic conquests. By research we may ascertain how Turenne, Marlborough, Alva, Frederick the Great, Washington, Napoleon, and Wellington were supplied, but who that can name their battles and their captains can name the men who furnished and outfitted and fed their armies?

During the World War and since we have heard much (and rightly) of marshals and generals in uniform, and what they did with all the vast and complex machinery and enginery of war with which they were so abundantly supplied, and but relatively little of those in mufti who were the sources of supply.

The general public is ignorant of what was nothing less than an epic that went on under its eyes. Save for a few specialists, the members of our own military establishment know but little more. Probably even Pershing and the highly motive Dawes have but small knowledge of the processes

by which the industries of America supplied them. But, when the histories of these times are finally written, the brilliant records for posterity will be found, not only in the battle-fields, but equally in the offices and mills that planned and produced, in the ships and railways that carried, in the great coördinations that wielded for the first time all the strength of nations of scores of millions multiplied by the powers of steam and electricity. The pomp and circumstance of war will always fascinate, but, as time goes on, men will be more and more interested in the accounts of how the mastodonic nations of modern times were brought to exercise all their powers and put them into effective application behind armies that demanded and consumed so much more than all the other hosts that have gone to battle in this world of wars.

We are still too near the deeds of the inarticulate figures in sack suits who directed the outpouring of America's productive powers for war's demands to realize that supremely able men came to great tasks. When the war was over, they did not march up Fifth Avenue to the cheers of their admiring countrymen. Tired in many cases, utterly drained from long effort and depressed reaction, they shut their Government desks and trickled back one by one to the old desks in the offices of everyday business and industry. For the individuals of the generalship of the industrial forces there was neither present distinction nor hope of future fame. They wrought in the anonymity of association. While they labored, they were worried by fault-finders, and when they went home, they were followed by the din of investigators who sought to advertise themselves by searching out here and there some muffed detail of execution in the work of men who toiled fiercely in the press of war "at a ten-league canvas with brushes of comets' hair." But a nation of industrialists will eventually do honor to the leaders who led in industry in war. The men of the War Industries Board, and those who preceded them in too loosely joined committees and boards, deserved well of their country, and, though their deserts are not symbolized in triumph, they will eventually come into them.

We have seen the narrative, with some explication, of

their work unfold in the preceding chapters, and it remains but to underscore here and there the record of an extraordinary achievement in an exceptional time.

Perhaps the best proof of the quality of the service rendered by the War Industries Board was that there was so little shock and confusion when it let go of the reins of power. "The basis of political economy," says Emerson, "is non-interference. The only safe rule is found in the self-adjusting meter of supply and demand. Do not legislate. Meddle and you snap the sinews with your sumptuary laws."

That was the belief of men who were called on to deal with the consequences of the huge meddling of war. The meter was no longer self-adjusting, but they sought in all their controls to align themselves and their ordinances with the nature of men and the flow of events. Believers in individualism, they had avoided nationalizing industry while directing it nationally. Believers in the initiative of the free man, opponents of paternalism, devotees of the free play of economic forces, they yet had found a way to harness industry and commerce and to drive them without harsh curbing or paralyzing domination.

So far as the War Industries Board was concerned, it let go of its control of industry when the armies ceased to fight. It refused to believe that there was any problem of decontrol, and this belief was based on its knowledge that it had not deprived industry of its individual vitality or robbed it of its internal energy. It had massed industry for a common purpose, but it had done so according to the genius of individualism. With actual or conceded powers that were almost unlimited in extent, it was as far as possible from being comparable to an autocratic bureau. It was democratic in purpose and method, and yet, except for price-fixing in the later stages, the power of decision was singular. Its methods are deserving of the closest study of statesmen, for they combined the efficiency of autocracy with the spirit of democracy. After May, 1918, its charter consisted of a definition of purposes and virtually unlimited power to realize them.

This power and this responsibility were lodged in one man. It was, therefore, the very antitype of the ordinary

governmental bureaus, whose powers and duties are defined with such minute detail that their heads are little better than automatons; with the result that equity is sacrificed to legalism and efficiency to formalism. We cannot expect great administrators under such conditions. The civil service will not be sought as a career by men of talent and genius for administration, if there be nothing but forms for them to follow and no outlet for originality and initiative. The history of the War Industries Board shows us how much better government might be if we could draw to it the type of men who so faithfully served that body. In a broad way of speaking, the best men of America are not in politics or government because public life does not provide the play for the individual genius that is found in finance, commerce, and industry.

Private life coheres and prospers because it is based on confidence, which endows its leaders with power and responsibility. Public life disintegrates and fails because it is based on suspicion and manacles its leaders with impotency and irresponsibility. Government will continue to be mediocre, blundering, and inefficient until the place seeks the man, and not the man the place. And that will not be until office becomes an opportunity instead of a strait-jacket.

The function of the War Industries Board was to shape production and its incidence to meet the huge and exceptional demands of war. This involved a knowledge of requirements, a reliable cataloguing of resources, a system of precedence or priority, the regulation of prices; and the direction, restriction, and stimulation of industry. Neither the origin nor the current of requirements was within the control of the Board. Considering them as they came to the Board — and not as they might have been presented — they were dealt with brilliantly. They were dissected, analyzed, reduced to commodity equivalents, translated into terms of labor, power, finance, and transportation, and transmitted to industry in the orderly channel of priority. Order and regularity thereby succeeded chaos, but the system never precluded the exceptional, and no emergency was denied because of the ease of routine.

On the side of resources, the Board's achievements were remarkable. These were in reality almost as unknown and variable as requirements, and the existing data were grotesquely inadequate. As the rising tide of war demands covered one commodity after another, the Board ascertained actual and potential resources with celerity and exceptional accuracy. Its use of the data when obtained was prompt and highly adaptive. Its use of the instrumentalities of conversion, curtailment, and conservation as applied to resources and facilities was cool and deliberate in the face of panicky demands.

It never forgot that, while it was called upon to give excessive temporary enlargement to some of the organs of the economic body and to shrink others, the alterations must be such as not to weaken the body as a whole. Its course with regard to the so-called non-essential or non-war industries was commendably cautious. It acted in this respect with the consciousness that, in such a complex fabric as modern industrialism, with its often obscure but powerful inter-relations and reactions, psychological as well as economical, it was a dangerous and difficult task to distinguish between the essential and non-essential. It saw, in many an apparently dispensable trade of manufacture, functions analogous to those of the ductless glands of the human body.

The method of controlling prices adopted by the Board was rational and fundamental. It dealt almost entirely with materials rather than articles. It thereby checked price inflation at the source and tended to eliminate the evils of pyramiding. Practically all the great increases in prices in commodities were checked when the Board began to establish prices, which is to say that prices were not inflated by the entry of the United States into the war. Roughly, the peak of prices was reached about the time or just after the United States became a belligerent; but these were fictitious prices, and Government purchases of the basic commodities were made at lower and stabilized prices, thanks to the success of the Board or what became the Board in negotiating prices by agreement before it had the power of price-control.

This mastery of rising prices precisely at the time when

the enormous war demands of the greatest of the warring nations were added to an already extraordinary demand, was one of the most brilliant economic successes of the war. In this field the War Industries Board was distinctly forehanded. The credit for this pivotal success is due to the foresight of Mr. Baruch and to the patriotism of the masters of production. It saved the country billions and incalculably checked inflation.

In the beginning Mr. Baruch had very little support from the great financiers and bankers of the country. They still clung to the idea that supply and demand should be left to work out their own price destinies and that Government should not place artificial trammels on business, appearing to ignore the fact that, by its act of entering the war and becoming the creator of *a demand that could not wait*, the Government had made an artificial condition of demand which would be hopeless against an uncontrolled supply. The financiers saw in mounting prices an easy way of financing the war by taxation of profits, but seemed to ignore the dragon's-teeth crop of by-products of the resulting instability of prices.

It is not to be inferred that because the Board stabilized and held down the prices of certain commodities to the Government, the Allies and the private consumers thereof, the public benefited accordingly. The middlemen and retailers absorbed a large part of what the producers gave up. How much could have been accomplished in this field is dubious. The experience of minute price-control in Europe parallels the failure to date of the enforcement of prohibition in this country. We know now that law is not always omnipotent. Yet it became apparent that the maintenance of the public morale required a measure of control of retail prices of some of the necessities. As the end of the war approached, the Board was girding itself for this difficult and delicate task.

The conception of the scheme of priority and its application was perhaps the greatest achievement of the War Industries Board. It was at once the source and the manifestation of power. Caught in the clutch of priority, there was

no escape for the obstinate. Primarily a device for providing, it became an irresistible weapon of compelling. An insurance of maintenance to the faithful, it became a terror to the false. Conceived as the "routining" of a nation, it became also its discipline. Ostensibly a contrivance for dependable delivery, it became also one for withholding. It was at once the comfort of the willing and the scourge of the unwilling. To be stricken from the preference list was to be damned; to be on it was industrial salvation. Unknown to the written law, it became the greatest law of the land. The manufacturer who sinned against priority sinned against his business life. It was power over all commercial environment.

All else that the Board did in the regulation of trade, industry, and transportation issued from priority. Price-fixing was but an annex to priority, for in priority the Board held the factors of compulsion that induced reasonableness of desire and gave knowledge and control over the factors of prices. Thus priority brought not only order and system, but power and its whip. And yet the astonishing thing about priority as practiced in America was its automaticity. Men and industries sorted themselves and their tasks as they entered the ordered maze of priority, much as crowds entering a stadium assign themselves to entrances according to numbers or the colors of their tickets. Each contractor or manufacturer was put on his honor to determine the color of his card of admission, according to certain general rules. That there was an occasional abuse of individual determination cannot be doubted, but in the main it was exercised with fidelity and discretion. The exceptions were as nothing compared to the advantages of self-determination. The arbitrariness and the possible favoritism of a universal use of permits would have challenged evasion and involved external policing. The self-application of priority was in harmony with the genius of America. It was the most signal demonstration of the rare talent of the Board for direction in accordance with human nature in its American variation.

It was to this subtle sagacity that we must attribute the Board's rapid progress latterly toward general control of the whole industrial field and centralized direction of all

the economic activities of Government, with so little friction and so little general realization of its grasp on power. Concerned always with centers rather than peripheries, its control was often obscure when most dominant. Much of its best work was accomplished through independent agencies, notably the Fuel Administration, the War Trade Board, and the Railroad Administration. Its own organization was but slender.

The growing brain of the whole body of war enterprise, deriving power from the use of power, it came to be the head center of the entire economic activity of the Nation.

Many-willed America had never known or even dreamed of anything comparable to it. Great captains of industry accepted its decrees as inevitable, and its will touched the remotest hamlet and farmstead and shaped the commercial life of crowded cities.

All industry and all commerce were conformed to its policies. Like Carnot, the great war minister of the French First Republic, it was the organizer of victory. And not alone for America, but to a very important extent for the Allies. All-productive America was the commissary of its own armies and of those of the Allies. Thus the War Industries Board was comparable on the side of economic power to the American army on the side of man-power.

The analogy is complete in theory, but was not so in practice. The Nation conscripted its men by direct statute, but not so with its resources. In another war the principle of the selective draft should be applied to dollars as well as to men. Industry should be persuaded to coöperate of its own initiative as in the World War, but behind all industrial mobilization should be the formally adopted principle of conscription, which is the direct inference of the conception of modern war as a war of all persons and things. Resources and facilities should be used with as little thought of profit as human life is used. In considering the work of the War Industries Board for the purpose of learning how to prepare for industrial mobilization for another great war, our military authorities and Congress should not overlook the fact that the selective draft of industry is the logical twin of the selective draft of men. In the next war all

industry — the whole economic life of the Nation — as well as human life should be conscripted. As has been said in Chapter IX, "Nothing undermines the will to war so rapidly as the popular conviction of widespread profiteering and exploitation."

It is yet too early to determine how much the War Department and the army have learned from the industrial and commercial experience of the World War. With an amazing but familiar lack of foresight, Congress has made no pecuniary provision for the maintenance of a skeleton liaison between the army and industry, though the Assistant Secretary of War is made responsible for the articulation of military and industrial forces, and there is slowly evolving a plan of familiarizing in peace-time a nucleus of officers with industrial problems and processes and, conversely, of acquainting manufacturers with military requirements. Coördination of requirements is being studied and resources and facilities are being classified with the intent that in another emergency every great manufacturing plant will know what will be required of it. So far as the present officers of the General Staff and the supply agencies are concerned, the lesson of broad geographical distribution of requirements seems to be reasonably well understood, as well as the fact that all articles must be translated into terms of commodities.

Considering the lack of financial provision and the civilian reaction from war and all that pertains to war, it appears that a certain amount of progress is being made in that pre-war provision for military and industrial partnership which is the *sine qua non* of the integration of the full military power of the Nation. Such progress, however, will inevitably be restricted if, indeed, not wholly valueless, unless qualified industrial experts from civilian life are allowed to mould the programme of whatever industrial preparedness may be ours. No one who witnessed the spectacle of an American war department, thrust unprepared into a great modern conflict, going down for the third time in an uncharted sea of industrial-military problems, could come to any other conclusion. It was the civilian experts of the War Industries Board who saved this situation from

actual tragedy; they or their like should have the controlling voice in making humanly possible the avoidance of a similar condition.

The subject of industrial preparedness should not be left without pointing out that in another conflict methods must be devised to prevent Federal post-war repudiation of contracts entered into in good faith by business men. Such repudiation can be unnecessarily cruel and is calculated to reflect in an ugly way on the honor of a great country. And it is shortsighted policy, no matter how loud the demands for post-war retrenchment may be.

It is not easy to determine what permanent influences the War Industries administration may have on American industrial practice. After a short business lull the war was followed by a brief boom and that by the depression of 1921-22, and neither condition was suitable to the disclosure of permanent effects. The efforts of Herbert Hoover, as Secretary of Commerce, to promote the economic well-being of the country through revisions of commercial practices, however, show that the lessons of the experience of the War Industries Board have not been wholly forgotten.

It is probable that there will never again be such a multiplicity of styles and models in machinery and other heavy and costly articles as there was before the restrictions necessitated by the war. Undoubtedly, the discovery that traditional methods had involved the excessive use of materials for many purposes will be remembered and applied. The revelation of the possibilities of conversion and the ease with which supplies of manufactured goods can be produced to meet the most extraordinary demands will result in satisfaction with profits that will not be too attractive and in a better balance between production and consumption.

It is also likely that, even if some public statistical agency does not undertake to appraise supply and demand in the whole field of industry, individual corporations and industrial groups will concern themselves much more with the gathering of data that will make possible the avoidance of periods of extreme surfeit as well as of extreme scarcity. In this manner commercial and industrial stability will be promoted. It is admitted that in many important lines

producers are as deficient in their knowledge of future requirements as the army was in the beginning of the war. The efforts of the War Industries Board to ascertain all requirements—public and private—for the commodities with which it was concerned, and its complete survey of production, was a hint to thoughtful business men that some such orderly counterpoising might be possible in peace.

Industrial control for war purposes, like military control of fighting men, is of little avail unless it is primarily strategic. The strategy of physical conflict was long ago developed, but, prior to the World War, industrial strategy was almost unknown except in the crude form of blockades by force. In none other of the Allied countries was industrial strategy in both its domestic and external phases so far developed as it was in the United States toward the end of the war. The game of commerce, finance, and production was played throughout the world in support of the armies of the Allies.

We are now come upon a time when it is the business of Government to direct the strategy of industry for its nationals in the bloodless contests of trade. If for a time war shall be banned, the foreign activities of Government should be directed to securing by industrial strategy what in other days was obtained by military force. The flag was formerly sent ahead of trade. Now consolidated national intelligence must promote trade. The Department of State should work hand-in-glove with the Department of Commerce to open and hold the markets that our overdeveloped manufacturing industries need for full-time production. There are substantial indications that this conception is being adopted by those departments and that the beginnings of a settled policy of commercial strategy are being made. The ideas conceived and applied by the War Industries Board in war are being applied in peace by the Department of Commerce, and some of the executives of the former are assisting in the evolution of the commercial strategy of peace.

The commodity section plan has been adapted to peacetime needs in the Bureau of Foreign and Domestic Commerce, and the Census Bureau has made the beginnings

of a continuous commodity survey. As in war, the commodity sections stood between Government and industry — that is, between requirements and supplies — so now the commodity sections stand between foreign trade wants and domestic sources of supply. All of the lessons in the advantages of coöperation learned during the war are not being forgotten. The new commodity sections, so far as they have been formed, deal with essentially the same commodity production groups as the War Industries Board assembled.

Here we see the beginnings of the application in peace of the idea of nationally directed industrial strategy. It is plain that we are to confront nationally directed commercial strategy by our competitors carried to such an extent that it is doubtful if we can successfully meet it without some reorganization of the Government and a delegation of authority that Congress will be reluctant to make. The control of shipping, the tariff, taxes, railway tariffs, foreign finance need to be centralized in some administrative body, as they were more or less centralized in the War Industries Board.

How to maintain the price benefits of free competition, and obtain the benefits of the economies that can be effected only by association and united effort, is a difficult problem. However it may be solved, the fact will remain that the War Industries Board was the pioneer revealer of the immense wastes of production as generally conducted, and the greatest of demonstrators of the possibilities of economies. In the long run economy must find a way to prevail. Tremendous wastes of service and material cannot be tolerated in the lean and laborious years that are before the world.

The War Industries Board died with the war. It has no history worthy of mention after November 11, 1918. Beyond the overlapping periods of price-control, it had no commitments and no involvements. To close its doors it had little to do but to complete its records. Within a week the commodity sections had dissolved, and quiet reigned in the rooms that had so long been the motor centers of the indus-

try of a continent. Its business was to energize, accelerate, and order the material productive forces of the Nation for the ends of war. It operated on and through all the departments and agencies of Government. Its powers were fed by what it did in the great emergency; its staff was the whole of Government.

It had no bureaucratic organization to unravel, no *post-bellum* entanglements to dissolve. Every department of Government that had participated in the greatest governmental activity of the age was, for all the Board's potency of direction, integral and intact. It used and swayed them all, but had not organically infused itself into them. Itself a loose federation, though functionally compacted by self-sacrifice and high endeavor, it had served as the federal bond of the statutory organisms of Government, but had not absorbed or weakened them. All the formal business of war administration was in its hands, and all the data and equipment to clear away the litter of war and deal with the multitudinous adjustments that had to be made between Government and industry.

The magnificent war formation of American industry was dissipated in a day; the mobilization that had taken many months was succeeded by an instantaneous demobilization. For the War Trade Board, the Shipping Board, the Food Administration, and, to some extent, the Fuel Administration and other of the temporary agencies, there were problems and duties of time-consuming decontrol. The Council of National Defense, which had worked out of a morass of internal pessimism into doing effective things for the Nation, addressed itself to extensive economic research in questions of reconstruction and readjustment, notably with regard to the high cost of living, and, through its great field machinery, to matters of demobilization and reëmployment of service men.

The War Industries Board might have elected to remain for a long time on the plea of its necessity in a disordered world, but it judged that it was not geared or powered to go backward, and that American business was competent to resume without coddling and nursing the stubborn independence it was so loath to surrender.

Yet, contemplating the vastness of its scope, the soundness of its methods, and the sagacity of its measures, one wonders whether some like controller of world economic forces might not have dealt as well with reaction as the War Industries Board did with action.

However that may be, we have the certain knowledge that in the War Industries Board American democracy superbly demonstrated its power to rise to great emergencies in the Nation's business, just as the army and fleet reflected its military adaptability. The War Industries Board was a governmentally sponsored committee of American industry to administer industry in war. It was the American business man in action for a common end. Russia was torn to pieces by its soviet of proletarians; America was united by the protean forces of its managers and producers.

THE END

APPENDICES

APPENDIX I

SECTION 2 OF THE ARMY APPROPRIATION ACT, APPROVED AUGUST 29, 1916, CREATING THE COUNCIL OF NATIONAL DEFENSE

SEC. 2. That a Council of National Defense is hereby established for the coördination of industries and resources for the national security and welfare, to consist of the Secretary of War, the Secretary of the Navy, the Secretary of the Interior, the Secretary of Agriculture, the Secretary of Commerce, and the Secretary of Labor.

That the Council of National Defense shall nominate to the President, and the President shall appoint, an advisory commission, consisting of not more than seven persons, each of whom shall have special knowledge of some industry, public utility, or the development of some natural resource, or be otherwise specially qualified, in the opinion of the council, for the performance of the duties hereinafter provided. The members of the advisory commission shall serve without compensation, but shall be allowed actual expenses of travel and subsistence when attending meetings of the commission or engaged in investigations pertaining to its activities. The advisory commission shall hold such meetings as shall be called by the council or be provided by the rules and regulations adopted by the council for the conduct of its work.

That it shall be the duty of the Council of National Defense to supervise and direct investigations and make recommendations to the President and the heads of executive departments as to the location of railroads with reference to the frontier of the United States, so as to render possible expeditious concentration of troops and supplies to points of defense; the coordination of military, industrial, and commercial purposes in the location of extensive highways and branch lines of railroad; the utilization of waterways; the mobilization of military and naval resources for defense; the increase of domestic production of articles and materials essential to the support of armies and of the people during the interruption of foreign commerce; the development of seagoing transportation; data as to amounts, location, method, and means of production, and availability of military supplies; the giving of information to producers and manufacturers as to the class of supplies needed by the military and other services of the Government, the requirements relating thereto, and the creation of relations which will render possible in time of need the immediate concentration and utilization of the resources of the Nation.

That the Council of National Defense shall adopt rules and regulations for the conduct of its work, which rules and regulations shall be subject to the approval of the President, and shall provide for the work of the advisory commission, to the end that the special knowledge of such commission may be developed by suitable investigation, research, and inquiry and made available in conference and report for the use of the council; and the council may organize subordinate bodies for its assistance in special investigations, either by the employment of experts or by the creation of committees of specially qualified persons to serve without compensation, but to direct the investigations of experts so employed.

That the sum of \$200,000, or so much thereof as may be necessary, is hereby appropriated, out of any money in the Treasury not otherwise appropriated,

to be immediately available for experimental work and investigations undertaken by the council, by the advisory commission, or subordinate bodies, for the employment of a director, expert and clerical expenses and supplies, and for the necessary expenses of members of the advisory commission or subordinate bodies going to and attending meetings of the commission or subordinate bodies. Reports shall be submitted by all subordinate bodies and by the advisory commission to the council, and from time to time the council shall report to the President or to the heads of executive departments upon special inquiries or subjects appropriate thereto, and an annual report to the Congress shall be submitted through the President, including as full a statement of the activities of the council and the agencies subordinate to it as is consistent with the public interest, including an itemized account of the expenditures made by the council or authorized by it, in as full detail as the public interest will permit: *Provided, however,* That when deemed proper the President may authorize, in amounts stipulated by him, unvouchered expenditures and report the gross sum so authorized not itemized.

APPENDIX II

THE OVERMAN ACT

[Approved May 20, 1918.]

AN ACT Authorizing the President to coördinate or consolidate executive bureaus, agencies, and offices, and for other purposes, in the interest of economy and the more efficient concentration of the Government.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That, for the national security and defense, for the successful prosecution of the war, for the support and maintenance of the Army and Navy, for the better utilization of resources and industries, and for the more effective exercise and more efficient administration by the President of his powers as Commander in Chief of the land and naval forces, the President is hereby authorized to make such redistribution of functions among executive agencies as he may deem necessary, including any functions, duties, and powers hitherto by law conferred upon any executive department, commission, bureau, agency, office, or officer, in such manner as in his judgment shall seem best fitted to carry out the purposes of this act, and to this end is authorized to make such regulations and to issue such orders as he may deem necessary, which regulations and orders shall be in writing and shall be filed with the head of the department affected and constitute a public record: *Provided*, That this act shall remain in force during the continuance of the present war and for six months after the termination of the war by the proclamation of the treaty of peace, or at such earlier time as the President may designate: *Provided further*, That the termination of this act shall not affect any act done or any right or obligation accruing or accrued pursuant to this act, and during the time that this act is in force: *Provided further*, That the authority by this act granted shall be exercised only in matters relating to the conduct of the present war.

SEC. 2. That in carrying out the purposes of this act the President is authorized to utilize, coördinate, or consolidate any executive or administrative commissions, bureaus, agencies, offices, or officers now existing by law, to transfer any duties or powers from one existing department, commission, bureau, agency, office, or officer to another, to transfer the personnel thereof or any part of it either by detail or assignment, together with the whole or any part of the records and public property belonging thereto.

SEC. 3. That the President is further authorized to establish an executive agency which may exercise such jurisdiction and control over the production of aeroplanes, aeroplane engines, and aircraft equipment as in his judgment may be advantageous; and, further, to transfer to such agency, for its use, all or any moneys heretofore appropriated for the production of aeroplanes, aeroplane engines, and aircraft equipment.

SEC. 4. That for the purpose of carrying out the provisions of this act, any moneys heretofore and hereafter appropriated for the use of any executive department, commission, bureau, agency office, or officer shall be expended only for the purposes for which it was appropriated under the direction of such other agency as may be directed by the President hereunder to perform and execute said function.

SEC. 5. That should the President, in redistributing the functions among the

executive agencies as provided in this act, conclude that any bureau should be abolished and it or their duties and functions conferred upon some other department or bureau or eliminated entirely, he shall report his conclusions to Congress with such recommendations as he may deem proper.

SEC. 6. That all laws or parts of laws conflicting with the provisions of this act are to the extent of such conflict suspended while this act is in force.

Upon the termination of this act all executive or administrative agencies, departments, commissions, bureaus, offices, or officers shall exercise the same functions, duties, and powers as heretofore or as hereafter by law may be provided, any authorization of the President under this act to the contrary notwithstanding.

APPENDIX III

COMMITTEES UNDER AND COÖPERATING WITH MR. BARUCH

IN HIS CAPACITY OF MEMBER OF THE ADVISORY COMMISSION OF THE COUNCIL OF NATIONAL DEFENSE

The membership of these committees is given as of June 30, 1917. The list is taken from the First Annual Report of the Council of National Defense.

COÖPERATIVE COMMITTEE ON ALCOHOL

HORATIO S. RUBENS, director United States Industrial Alcohol Co., 27 William Street, New York City, chairman.

JULIUS KESSLER, president Distillers' Securities Corporation, 40 Exchange Place, New York City.

CARMAN N. SMITH, secretary Michigan Chemical Co., Bay City, Mich.

COÖPERATIVE COMMITTEE ON ALUMINUM

ARTHUR V. DAVIS, president Aluminum Co. of America, Pittsburgh, Pa., chairman.

E. E. ALLYNE, president Aluminum Castings Co., Cleveland, Ohio.

JOSEPH A. JANNEY, JR., Morris Building, Philadelphia, Pa., partner in Janney, Steinmetz & Co.

COÖPERATIVE COMMITTEE ON ASBESTOS, MAGNESIA, AND ROOFING

THOMAS F. MANVILLE, president H. W. Johns-Manville Co., New York City, chairman.

PHILIP ALLEN, Bird & Son.

COÖPERATIVE COMMITTEE ON BRASS

CHARLES F. BROOKER, president American Brass Co., Ansonia, Conn., chairman.

E. O. GOSS, assistant treasurer Scovill Manufacturing Co., Waterbury, Conn.

BARTON HASELTON, secretary, treasurer, and general manager Rome Brass Co., Rome, N. Y.

LEWIS H. JONES, president Detroit Copper & Brass Co., Detroit, Mich.

F. J. KINGSBURY, president Bridgeport Brass Co., Bridgeport, Conn.

COÖPERATIVE COMMITTEE ON CEMENT

JOHN E. MORRON, president Atlas Portland Cement Co., New York City, chairman.

B. F. AFFLECK, president Universal Portland Cement Co., Chicago, Ill.

GEORGE T. CAMERON, president Santa Cruz Portland Cement Co., San Francisco, Cal.

RICHARD HARDY, president Dixie Portland Cement Co., Chattanooga, Tenn.

Col. E. M. YOUNG, vice president Lehigh Portland Cement Co., Allentown, Pa.

R. J. WIG, Bureau of standards.

COÖPERATIVE COMMITTEE ON CHEMICALS

Dr. WM. H. NICHOLS, General Chemical Co., 25 Broad Street, New York City, chairman.

VAN H. MANNING, Bureau of Mines, Washington, D. C., Ex officio.

C. A. RICHARDS, Department of Commerce, Washington, D. C., Ex officio.

Dr. M. T. BOGERT, National Research Council, Washington, D. C., Ex officio.

Maj. J. T. CRABB, United States Army, retired; assistant to chairman.

J. D. C. BRADLEY, secretary.

SUBCOMMITTEE ON ACIDS

H. R. GRASSELLI, Grasselli Chemical Co., Cleveland, Ohio, chairman.

HENRY HOWARD, Merriman Chemical Co., Boston.

SUBCOMMITTEE ON ALKALIS

J. D. PENNOCK, Solvay Process Co., Syracuse, N. Y., chairman.

T. N. HICKS, Niagara Alkali Co., Niagara Falls, N. Y.

SUBCOMMITTEE ON ELECTROCHEMICALS

JOHN J. RIKER, 19 Cedar Street, New York City.

SUBCOMMITTEE ON FERTILIZERS

HORACE BOWKER, 2 Rector Street, New York City, chairman.

CHARLES H. MACDOWELL, president Armour Fertilizer Works, Chicago.

CHAS. G. WILSON, Virginia Iron, Coal & Coke Co., Richmond, Va.

SUBCOMMITTEE ON MISCELLANEOUS CHEMICALS

EDWARD MALLINCKRODT, Jr., 2600 North Second Street, St. Louis, chairman.

SUBCOMMITTEE ON COAL-TAR BY-PRODUCTS

WILLIAM H. CHILDS, president Barrett Co., 17 Battery Place, New York City, chairman.

SUBCOMMITTEE ON PYRITES

A. D. LEDOUX, 15 William Street, New York City.

SUBCOMMITTEE ON SULPHUR

HENRY WHITON, president Union Sulphur Co., chairman.

COÖPERATIVE COMMITTEE ON COPPER

J. D. RYAN, president Anaconda Copper Co., 42 Broadway, New York City, chairman.

R. L. AGASSIZ, president Calumet & Hecla Mining Co., 12 Ashburton Place, Boston, Mass.

W. A. CLARK, president United Verde Copper Co., 20 Exchange Place, New York City.

MURRY M. GUGGENHEIM, 120 Broadway, New York City.

JAMES McLEAN, vice president Phelps-Dodge Co., 98 John Street, New York City.

CHARLES MACNEILL, president Utah Copper Co., 25 Broad Street, New York City.

STEPHEN BIRCH, vice president Kinnecott Mines Co., 120 Broadway, New York City.

COÖPERATIVE COMMITTEE ON LEAD

CLINTON H. CRANE, president St. Joseph Lead Co., 61 Broadway, New York City, chairman.

FRED BRADLEY, president Bunker Hill & Sullivan Mining & Concentrating Co., San Francisco, Cal.

ED. W. P. BRUSH, American Smelting and Refining Co., 120 Broadway, New York City.

E. J. CORNISH, vice president National Lead Co., 111 Broadway, New York City.

HARRY L. DAY, Hercules Mining Co., Wallace, Idaho.

F. Y. ROBERTSON, vice president and general manager United States Metals Refining Co., 120 Broadway, New York City.

COÖPERATIVE COMMITTEE ON LUMBER

R. H. DOWNMAN, president National Lumber Manufacturers' Association, New Orleans, La., Munsey Building, Washington, D. C., chairman.

D. O. ANDERSON, lumber manufacturer, Marion S. C.

W. R. BROWN, lumber and paper manufacturer, Berlin, N. H.

W. E. DELANEY, president Kentucky Lumber Co., Lexington, Ky.

J. F. GREGORY, logger and lumber manufacturer, Tacoma, Wash.

GEORGE B. LEWIS, lumber manufacturer, Holyoke, Mass.

G. S. LONG, manager Weyerhaeuser Timber Co., Tacoma, Wash.

W. M. RITTER, president W. M. Ritter Lumber Co., Welch, W. Va.

E. A. SELFRIDGE, president Northwestern Redwood Co., San Francisco, Cal.

W. H. SULLIVAN, manager Great Southern Lumber Co.

C. H. WORCESTER, president C. H. Worcester Lumber Co., Chicago, Ill.

F. G. WISNER, Eastman Gardiner Lumber Co., Laurel, Miss.

E. T. ALLEN, manager Western Forestry and Conservation Association, Portland, Oreg.

R. S. KELLOGG, National Lumber Manufacturers' Association, secretary.

COÖPERATIVE COMMITTEE ON MICA

L. W. KINGSLEY, president Eugene Munsell & Co., 68 Church Street, New York City, chairman.

W. VANCE BROWN, Asheville Mica Co., Biltmore, N. C.

F. L. WATSON, president Watson Bros., Boston, Mass.

COÖPERATIVE COMMITTEE ON NICKEL

AMBROSE MONELL, president International Nickel Co., 43 Exchange Place, New York City, chairman.

COÖPERATIVE COMMITTEE ON STEEL AND STEEL PRODUCTS

ELBERT H. GARY, chairman United States Steel Corporation, 71 Broadway, New York City, chairman.

JAMES A. FARRELL, president United States Steel Corporation, 71 Broadway, New York City, chairman.

JAMES A. BURDEN, president Burden Iron Co., Troy, N. Y.

ALVA C. DINKEY, vice president Midvale Steel & Ordnance Co., Philadelphia, Pa.

WILLIS L. KING, vice president Jones & Laughlin Steel Co., Pittsburgh, Pa.
 E. G. GRACE, president Bethlehem Steel Co., 111 Broadway, New York City.
 CHARLES M. SCHWAB, chairman of board, Bethlehem Steel Co., 111 Broadway, New York City.

JOHN A. TOPPING, chairman Republic Iron & Steel Co., 17 Battery Place, New York City.

H. G. DALTON, Pickands, Mather & Co., Cleveland, Ohio.

E. A. S. CLARKE, president Lackawanna Steel Co., 2 Rector Street, New York City, Secretary.

H. H. COOK, American Iron & Steel Institute, New York City, assistant secretary.

SUBCOMMITTEE ON ALLOYS

JAMES A. FARRELL, 71 Broadway, New York City, president United States Steel Corporation, chairman.

E. A. S. CLARKE, president Lackawanna Steel Co., New York City.

E. G. GRACE, president Bethlehem Steel Co., South Bethlehem, Pa.

E. J. LAVINO, E. J. Lavino Co., Philadelphia, Pa.

A. A. FOWLER, Rogers Brown & Co., New York City, secretary.

SUBCOMMITTEE ON SHEET STEEL

W. S. HORNER, president National Association of Sheet & Tin Plate Manufacturing, Pittsburgh, Pa., chairman.

WALTER C. CARROLL, American Sheet Tin Plate, Pittsburgh, Pa.

CHARLES HADLEY, Alan-Wood Iron & Steel Co., Philadelphia, Pa.

SUBCOMMITTEE ON PIC TIN

JOHN HUGHES, assistant to president United States Steel Corporation, 71 Broadway, New York City, chairman.

E. R. CRAWFORD, president McKeesport Tin Plate Co., McKeesport, Pa.

JOHN A. FRYE, general purchasing agent American Can Co., 120 Broadway, New York City.

A. B. HALL, manager metal department National Lead Co., New York City.

THEODORE PRATT, assistant manager manufacturing department Standard Oil Co. of New York, New York City.

SUBCOMMITTEE ON STEEL DISTRIBUTION

JAMES A. FARRELL, president United States Steel Co., 71 Broadway, New York City, chairman.

E. A. S. CLARKE, president Lackawanna Steel Co., New York City.

JOHN A. TOPPING, chairman Republic Iron & Steel Co., New York City.

SUBCOMMITTEE ON SCRAP IRON

ELI JOSEPH, of Joseph, Joseph & Bros., New York City, chairman.

SAMUEL DEUTSCH, Ohio Iron & Metal Co., Chicago.

VERNON PHILLIPS, Perry, Buxton, Doane & Co., Philadelphia, Pa.

JOS. MICHAELS, Hyman-Michaels Co., Chicago, Ill.

SUBCOMMITTEE OF PIC IRON, IRON ORE, AND LAKE TRANSPORTATION

H. G. DALTON, Pickands-Mathers Co., Cleveland, Ohio, chairman.

F. BILLINGS, Todd Stambaugh Co., Cleveland, Ohio.

H. COULBY, Pittsburgh Steamship Co., Cleveland, Ohio.

C. T. DYER, W. P. Snyder & Co., Pittsburgh, Pa.

LEONARD PECKITT, president Empire Iron & Steel Co., Philadelphia, Pa.
F. B. RICHARDS, M. A. Hanna Co., Cleveland, Ohio.
W. T. SHEPPARD, Rogers, Brown Co., Buffalo, N. Y.
A. H. WOODWARD, Woodward Iron Co., Birmingham, Ala.
AMASA S. MATHER, Pickands-Mather Co., Cleveland, Ohio, secretary.

SUBCOMMITTEE ON TUBULAR PRODUCTS

JAMES A. CAMPBELL, president Youngstown Sheet & Tube Co., Youngstown, Ohio, chairman.
ANSON MARK, Mark Manufacturing Co., Chicago, Ill.
GEORGE MATHESON, Jr., vice president Spang Chalfant & Co., Pittsburgh, Pa.
W. H. ROWE, president Pittsburgh Steel Co., Pittsburgh, Pa.
E. WORCESTER, vice president National Tube Co., Pittsburgh, Pa.

SUBCOMMITTEE ON TIN PLATE

J. I. ANDREWS, general manager sales American Sheet & Tin Plate Co., chairman.
E. R. CRAWFORD, president McKeesport Tin Plate Co., McKeesport, Pa.
E. T. WEIR, president Phillips Sheet & Tin Plate Co., Weirton, W. Va.

SUBCOMMITTEE ON WIRE ROPE

KARL G. ROEBLING, general manager sales John A. Roebling's Sons Co., Trenton, N. J., chairman.
JOHN J. BRODERICK, president Broderick & Bascom Rope Co., St. Louis, Mo.
FRANK BAACKES, vice president and general sales agent American Steel & Wire Co., Chicago, Ill.

SUBCOMMITTEE ON WIRE PRODUCTS

FRANK BAACKES, vice president and general sales agent American Steel & Wire Co., Chicago, Ill.
GEORGE A. MASON, manager of sales Jones & Laughlin Steel Co., Pittsburgh, Pa.
JOHN C. NEALE, vice president and general manager of sales Midvale, Cambria & Worth Bros. Cos., Philadelphia, Pa.
J. E. FREDERICK, secretary Kokomo Steel & Wire Co., Kokomo, Ind.
H. SANBORN SMITH, vice president and general manager sales Gulf States Steel Co., Birmingham, Ala.

SUBCOMMITTEE ON COLD ROLLED AND COLD DRAWN STEEL OF THE STEEL AND STEEL PRODUCTS COMMITTEE

F. N. BEAGLE, president Union Drawn Steel Co., Beaver Falls, Pa., chairman.
E. L. PARKER, president Columbia Steel Shafting Co., Pittsburgh, Pa.
ROLAND GERRY, assistant general sales manager Jones & Laughlin Steel Co., Pittsburgh, Pa.

COÖPERATIVE COMMITTEE ON OIL

A. C. BEDFORD, president Standard Oil Co., 26 Broadway, New York City, chairman.
G. S. DAVISON, president Gulf Refining Co., Frick Building, Pittsburgh, Pa.

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E. L. DOHENY, president Mexican Petroleum Co., Los Angeles, Cal.

E. C. LUFKIN, president Texas Co., Whitehall Building, New York City.

JOHN H. MARKHAM, Jr., Daniels Building, Tulsa, Okla.

H. F. SINCLAIR, president Sinclair Refining Co., Equitable Building, New York City.

J. W. VAN DYKE, president Atlantic Refining Co., 3144 Passyunk Avenue, Philadelphia, Pa.

WILLIAM MUIR, president National Petroleum Association, Titusville, Pa.

H. G. JAMES, president Western Refiners' Association, Kansas City, Mo.

JOSEPH F. GUFFY, president Natural Gas Association of America, Pittsburgh, Pa.

JOHN A. MOFFATT, 26 Broadway, New York City, secretary.

COÖPERATIVE COMMITTEE ON RUBBER

H. STUART HOTCHKISS, president General Rubber Co., 1790 Broadway, New York City, chairman.

FREDERIC C. HOOD, Hood Rubber Co., Watertown, Mass.

ARTHUR MARKS, Bureau of Construction and Repair, Navy Department, Washington, D. C.

COÖPERATIVE COMMITTEE ON WOOL

JACOB F. BROWN, Brown & Adams, 269 Summer Street, Boston, Mass.

H. E. CAMPBELL, Flagstaff, Ariz.

JOSEPH R. GRUNDY, Wm. H. Grundy, Bristol, Pa.

F. J. HAGENBARTH, president National Association Wool Growers, Salt Lake City, Utah.

SIGMUND SILBERMAN, S. Silberman Sons, Chicago, Ill.

JAMES M. WILSON, McKinley, Wyo.

COÖPERATIVE COMMITTEE ON ZINC

EDGAR PALMER, president New Jersey Zinc Co., 55 Wall Street, New York City, chairman.

CHARLES W. BAKER, president, American Zinc, Lead & Smelting Co., 120 Broadway, New York City.

A. P. COBB, vice president New Jersey Zinc Corporation, 55 Wall Street, New York City.

SIDNEY J. JENNINGS, vice president United States Smelting, Refining & Mining Co., 120 Broadway, New York City.

CORNELIUS F. KELLEY, vice president Anaconda Copper Co., 42 Broadway, New York City.

N. BRUCE MACKELVIE, president Butte & Superior Copper Co., 25 Broad Street, New York City.

THOMAS F. NOON, president Illinois Zinc Co., Peru, Ill.

CHARLES T. ORR, president Bertha A. Mining Co., Webb City, Mo.

APPENDIX IV

THE WAR INDUSTRIES BOARD, WITH ITS MAIN DIVISIONS

MAIN DIVISIONS

THE BOARD:

BERNARD M. BARUCH, Chairman (ex officio member of all committees).	
ALEXANDER LEGGE, Vice Chairman	J. LEONARD REPLOGLE, Steel Administrator.
Rear Admiral F. F. FLETCHER, Navy.	L. L. SUMMERS, Technical Advisor.
Maj. Gen. GEORGE W. GOETHALS, Army.	ALBERT C. RITCHIE, General Counsel.
ROBERT S. BROOKINGS, Chairman Price-Fixing Committee.	H. P. INGELS, Secretary.
HUGH FRAYNE, Labor.	HERBERT BAYARD SWOPE, Associate Member.
EDWIN B. PARKER, Priorities Commissioner.	CLARENCE DILLON, HARRISON WILLIAMS, and HAROLD T. CLARK, Assistants to the Chairman.
GEORGE N. PEEK, Commissioner of Finished Products.	

PRICE-FIXING COMMITTEE:

Robert S. Brookings, chairman. Members: B. M. Baruch, chairman War Industries Board; W. B. Colver, chairman Federal Trade Commission; Hugh Frayne, labor representative, War Industries Board; H. A. Garfield, Fuel Administrator; Commander John M. Hancock, Navy representative; Lieut. Col. Robert H. Montgomery, Army representative; Henry C. Stuart; Dr. F. W. Taussig, chairman Tariff Commission; W. W. Phelps, secretary.

Labor Division.—Hugh Frayne, chairman.

War Prison Labor and National Waste Reclamation Section.—Dr. E. Stagg Whitin, chairman executive committee, National Committee on Prisons and Prison Labor; W. J. Spillman, chief, Office of Farm Management, Department of Agriculture; Capt. H. L. Baldensperger, Reclamation Division, United States Army; Anthony Caminetti, United States Commissioner of Immigration Department of Labor; John J. Manning, secretary, union label trades department, American Federation of Labor; Dr. Charles H. Winslow, assistant director of research, Federal Board for Vocational Education; Edwin F. Sweet, Assistant Secretary Department of Commerce; Lieut. J. B. Goldman, United States Navy; Maj. J. W. Riley, The Adjutant General's Office.

ALLIED PURCHASING COMMISSION:

Bernard M. Baruch, Robert S. Lovett, Robert S. Brookings. Business manager: Alex Legge, succeeded by James A. Carr; assistants: A. L. Bostwick, James C. Leddy and F. E. Penick.

REQUIREMENTS DIVISION:

Alex Legge, chairman. Members: Lieut. Col. C. C. Bolton, General Staff; George M. Brill, Emergency Fleet representative; James A. Carr, representing the Allies; Col. George H. Estes, Army representative; James Inglis; C. H. MacDowell, chemicals; P. B. Noyes, Fuel Administrator's representative; Edwin

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B. Parker, priority; George N. Peek, finished products; Admiral C. J. Peoples, Navy representative; M. B. Pool, Red Cross representative; T. C. Powell, Railroad Administrator's representative; J. Leonard Replogle, steel; A. W. Shaw, conservation; L. L. Summers, technical advisor, War Industries Board; Capt. M. N. Taylor, Navy representative; T. F. Whitmarsh, Food Administrator's representative; Maj. Seth Williams, Marine Corps representative; Pope Yeatman, nonferrous metals; W. E. Guylee, executive secretary.

Clearance Office—Requirements Division.—J. C. Musser, secretary; C. B. Hughes, assistant secretary.

FINISHED PRODUCTS DIVISION:

George N. Peek, commissioner of finished products; E. L. Crawford, assistant to commissioner; W. M. Ritter, assistant to commissioner, certifying officer; Walter Robbins, assistant to commissioner.

PRIORITIES DIVISION:

Edwin B. Parker, priorities commissioner; Rhodes S. Baker, assistant priorities commissioner.

Priorities Board.—Edwin B. Parker, priorities commissioner; Edward Chambers, director of traffic, United States Railroad Administration; Admiral F. F. Fletcher, United States Navy; Felix Frankfurter, labor representative; Gen. George W. Goethals, United States Army; Alex Legge, representative of Allied Purchasing Commission; P. F. Noyes, director of conservation, Fuel Administration; T. F. Whitmarsh, Food Administration; Charles R. Piez, vice president and general manager of the Emergency Fleet Corporation, representing the United States Shipping Board and Emergency Fleet Corporation; Clarence M. Woolley, member of the War Trade Board; H. G. Phillipps, secretary.

Priorities committee.—Edwin B. Parker, priorities commissioner, chairman; Charles K. Foster, vice chairman. Members: George Armsby; H. H. Barbour; W. W. Chase; Percy Holbrook; J. M. Hopkins; Henry Krumb; F. H. Macpherson; Rear Admiral N. E. Mason; Lieut. Col. C. A. McKenney; Everett Morss; Lucius P. Ordway; T. C. Powell; Rear Admiral A. V. Zane. Maurice Hirsch, secretary, and Marcus B. Hall, assistant secretary.

Labor section, priorities division.—A. W. Clapp, chief.

Nonwar construction section, priorities division.—D. R. McLennan, chief.

CONSERVATION DIVISIONS:

A. W. Shaw, chairman; Charles K. Foster; Dr. E. F. Gay; Lieut. Col. W. R. Roberts; C. H. MacDowell; Admiral Samuel McGowan; George N. Peek; T. C. Powell; Pope Yeatman; Melvin T. Copeland, executive secretary.

DIVISION OF PLANNING AND STATISTICS:

Edwin F. Gay, chairman; Henry S. Dennison, assistant chairman; H. R. Hatfield, director; J. Lee Coulter, chief of commodity section; Wesley C. Mitchell, chief of price section; Mills E. Case, chief of contract section; Leo Wolman, editor of Commodity Bulletin; William A. Barber; Alice C. Boughton; Stuart Daggett; L. K. Frank; Paul Willard Garrett; Walter Holsinger; Walter W. Stewart.

EMPLOYMENT MANAGEMENT COURSES:

James Inglis, chairman; P. E. Foerderer, vice chairman; Capt. Boyd Fisher, Government supervisor. (Operated under joint advisory committee of the

Army, Emergency Fleet Corporation, Labor Department, Navy, and War Industries Board.)

FACILITIES DIVISION:

Samuel P. Bush, director; Capt. C. Bamberger; C. W. Carroll; M. F. Chase; F. L. Dame; Capt. W. B. Dickinson; J. I. Downey; L. H. Kittredge; G. E. Miller; L. B. Reed; H. Williams.

DIVISION OF BUSINESS ADMINISTRATION:

John Esher Knobel, director and business manager; William E. Goodfellow, assistant business manager; Charles H. Birr, comptroller; W. G. Scott, disbursing officer; W. B. Martin, chief clerk; Charles J. Davis, assistant; L. Perry Ferguson, storekeeper; Mrs. Mary Newton, chief of bureau of personnel; H. L. Lambert, superintendent of buildings.

COMMODITY AND MISCELLANEOUS DIVISIONS AND SECTIONS

NOTE.—Each division and section had as members authorized representatives of the Army and of the Navy and of other purchasing departments interested in the commodity.

Agricultural implements and wood products.—E. E. Parsonage, chief; P. B. Schraevesande, assistant.

Automotive products section.—C. C. Hanch, chief; Edward J. Hickey, assistant.

Brass section.—Everett Morss, chief.

BUILDING MATERIALS DIVISION.—Richard L. Humphrey, director.

Assistants: W. A. R. Anthony; Morris C. Betts; A. L. Gladding; Norman H. Hill; Frank A. Kendall; C. M. Lyman; C. D. Morley; H. A. Schaffer; Edna M. Stangland; M. A. Styles; U. F. Turpin; F. W. Walker; Capt. George W. Riddle; Ira H. Woolson, advisory engineer.

New York branch: George L. Lucas, in charge.

Philadelphia branch: Herbert B. Allen, in charge.

Norfolk branch: W. E. Law, in charge.

Chain section.—John C. Schmidt, chief; Arthur E. Crockett, assistant.

CHEMICALS DIVISION.—Charles H. MacDowell, director.

Abrasives.—See Electrodes and abrasives section, chemicals division.

Acids and heavy chemicals section.—Albert R. Brunner, chief; Russell S. Hubbard, associate; A. E. Wells, associate.

Alkali and chlorine section.—(Caustic soda, soda ash, chlorine and chlorine products, lime, potash, and salt.) H. G. Carrell, chief; Lieut. E. A. Williams, associate.

Asbestos.—See Chemical glass and stoneware section, chemicals division.

Chemical glass and stoneware section.—(Asbestos and magnesia included.) Robert M. Torrence, chief.

Coal-gas products section.—(Toluol, benzol, xylol, phenol, solvent naphtha, road oil, asphaltum, acetylene, nitrogen, calcium carbide, rare gases, saccharin, hydrogen, and oxygen, including commandeering and allocation of toluol.) J. M. Morehead, chief; Ira C. Darling, associate toluol distribution.

Creosote section.—Ira C. Darling, chief.

Dye section (synthetic dyes and intermediate section).—Dr. Victor L. King, chief; Dr. J. F. Schoellkopf, jr., chief, resigned.

Electric furnaces, electrolysis, electrometallurgy.—See technical and consulting section, chemicals division.

Electrodes and abrasives section.—Capt. Henry C. Du Bois, chief.

Ethyl alcohol section.—William G. Woolfolk, chief; A. E. Wells, associate.

Ferroalloys section.—(Chrome, manganese, and tungsten ores and ferroalloys, such as ferro chrome, manganese, vanadium, titanium, silicon, and tungsten; also spiegeleisen, manganosite, and zirconium.) Hugh W. Sanford, chief; C. D. Tripp, associate.

Fine chemicals section.—(Miscellaneous analytical, photographic, and pharmaceutical chemicals, etc.) A. G. Rosengarten, chief.

Fire brick, chrome brick, etc.—See Refractories section, chemicals division.

Magnesia.—See Chemical glass and stoneware section, chemicals division.

Magnesite.—See Ferroalloys section.

Mica section.—C. K. Leith, chief.

Nitrate section.—Charles H. MacDowell, chief; J. A. Becker, associate; H. Ray Paige.

Paint and pigment section.—L. R. Atwood, chief; Russell S. Hubbard, chief, deceased.

Platinum section.—(Platinum, palladium, iridium.) C. H. Conner, chief; R. H. Carleton, associate; G. E. DeNike, associate.

Refractories section.—(Fire brick, chrome brick, etc.) Charles Catlett, chief.

Sulphur and pyrites section.—William G. Woolfolk, chief; A. E. Wells, associate; J. R. Townsend, associate.

Tanning material and vegetable dye section.—(Including inedible oils, fats, and waxes.) E. J. Haley, chief; E. A. Prosser, associate; Harold G. Wood, associate.

Technical and consulting section.—Dr. Herbert R. Moody, associate; Dr. E. R. Weidlein, associate; Dr. T. P. McCutcheon, associate.

Toluol.—See Coal-gas products section, chemicals division.

Wood chemical section.—(Including methyl alcohol, methyl acetone, acetone, ethyl methyl ketone, acetate of lime, acetic acid, acetic anhydride, formaldehyde, aspirin, methyl acetate, etc.) C. H. Conner, chief; A. H. Smith, associate; R. D. Walker, associate.

Statistics, chemicals section—Joint office on chemical statistics.—Capt. Willis B. Rice, associate; Lieut. M. R. Gordon, associate; Asst. Paymaster Dunning, associate; Arthur Minnick, associate.

Conversion of industry.—See Resources and conversion section.

Copper tubing.—See Brass section—Nonferrous tubing.

Cotton and cotton linters section.—See Textile division.

Crane section.—A. C. Brown, chief; Capt. C. E. Stamp, assistant chief; Louis P. Lipps.

Electrical and power equipment section.—Walter Robbins, chief; L. W. Grothaus, John H. Waterman, Allen P. Bender, Max Greenburg, Merritt M. Hughes, Wm. S. James, Thos. S. Knight, Edward R. Welles, J. A. Merwin.

Electric wire and cable section.—Le Roy Clark, chief.

Emergency construction committee.—Col. W. A. Starrett, chairman; Maj. Clair Foster; John Donlin, American Federation of Labor; Lieut. J. B. Talmadge, secretary.

EXPLOSIVES DIVISION.—M. F. Chase, director.

Felt section.—See Textile division.

Fiber.—See Jute, hemp, and cordage section.

Fire prevention section.—W. H. Merrill, chief; Charles H. Smith, associate chief of section; George W. Booth, associate chief of section; Frank Pierce, Wilbur Mallalieu.

Flax products section.—See Textile division.

Forgings, guns, small arms, and small arm ammunition.—Samuel P. Bush, chief; Capt. Clarence Bamberger; Charles W. Carroll.

Gold and silver section.—C. H. Conner, chief.

Hardware and hand tool section.—Murray Sargent, chief; Lawrence J. Stoddard, gauges; Thomas F. Bailey, mill supplies; Alfred L. Lincoln, drills and reamers; E. W. Lively, machinists' precision tools; L. H. Wetherell, cutlery, needles, sewing machines.

HIDE, LEATHER AND LEATHER GOODS DIVISION.—C. F. C. Stout, director.

Section chiefs.—Thomas Cover, jr., in charge of sole leather; O. C. Howe, in charge of foreign skins and hides; L. B. Jackson, in charge of domestic skins and hides; F. A. Vogel, in charge of upper leather; R. M. Pindell, jr., executive secretary.

Chiefs of bureaus.—C. D. P. Hamilton, shoe manufacturers; Charles J. Chisholm, shoe retailers; George Rowbotham, belting; Charles A. Rogers, harness and personal equipment, except shoes and clothing; Harry J. Louis, gloves.

Assistants.—Robert D. Ware, belting bureau; George R. Wheeler, shoe manufacturing bureau; Thomas W. Hughes, assistant to executive secretary.

Inland traffic section.—Thomas C. Powell, chief; Henry F. Bell, assistant.

Jute, hemp, and cordage section.—E. C. Heidrich, jr., chief.

Legal section.—H. M. Channing, chief; W. C. Saeger; E. M. Dodd, jr.; H. R. Gower.

Linters and cotton goods section.—See Textile division.

Lumber section.—Charles Edgar, director; Maj. Armistead M. Cooke, assistant.

Machine tool section.—G. E. Merryweather, chief; Alvin B. Einig; Arthur J. M. Baker; Roland Houck; Ernest D. Crockett; Floyd C. Lowell; Walter L. Dinforth.

Medical section.—Lieut. Col. F. F. Simpson, chief; David L. Kean, hospital furniture and equipment, surgical instruments; A. G. Rosengarten, medicinal chemicals.

Mica section.—See Chemicals division.

Miscellaneous commodities section.—M. B. Foster, chief. (This section handles all commodities for which we have no specially established commodity section.)

Nonferrous metals section.—(Antimony, aluminum, copper, lead, nickel, quicksilver, zinc.) Pope Yeatman, chief; E. C. Thurston, assistant; Andrew Walz, assistant; I. H. Cornell, lead and zinc.

Nonferrous tubing section.—See Brass section.

Optical glass and instruments section.—G. E. Chatillon, chief; Maj. F. E. Wright; Lieut. Commander H. A. Orr.

Power section.—Frederick Darlington, chief; Charles B. Davis, business assistant; Maj. Charles F. Lacombe; Maj. George S. Sever; Maj. Malcolm MacLaren; Capt. Carroll Shaw; Capt. Ashton M. Tinsley; Capt. John C. Damon; Lieut. George K. Miltenburger; Lieut. William W. Stanley.

Production division.—See Special advisory committee on plants and munitions.

PULP AND PAPER DIVISION.—Thomas E. Donnelley, director.

Newspaper section.—G. J. Palmer, chief.

Paper economies section.—I. W. Blanchard, chief.

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Manufacturing section.—S. L. Willson, chief.

Fiber board and container section.—Harold W. Nichols, chief.

Railway equipment and supplies section.—J. Rogers Flannery, chief.

Resources and conversion section.—Charles A. Otis, chief; John A. Kling, assistant chief; Charles H. Anthony; Edward F. Bulmahn; W. T. Rossiter; Irving H. Taylor.

Rubber section.—See Textile division.

Shipping—Mineral imports and exports.—C. K. Leith.

Small arms and small-arms ammunition.—See Forgings, guns, etc., section.

Small tools.—See Hardware and hand-tool section.

Special advisory committee on plants and munitions.—S. M. Vaucrain, chairman; Capt. C. K. Rockwell, J. M. Hansen, Henry R. Rea, Frank W. Morse, E. F. Wood, Admiral A. R. Couden, G. M. Shaw.

STEEL DIVISION.—J. Leonard Replogle, director of steel supply; Frank Purnell, assistant director; E. D. Graff, special agent.

Steel products section.—F. E. Thompson, chief; G. M. Bartley, cars and locomotives; D. A. Holloran, emergency fleet; J. A. McDonald, mill expert; D. F. Mann, wire products; R. I. Richardson, chief clerk; G. C. Shidle, tubes; C. G. Thomas, sheets; H. H. Weaver, mill schedules.

Projectile steel, rails, alloy steel, and cold-drawn steel section.—Capt. D. E. Sawyer, chief; John W. Horr, assistant, alloy steel and cold-drawn steel; R. L. Lovell, assistant, projectile steel; F. A. Weymouth, assistant, rails.

Pig iron section.—Jay C. McLauchlan, chief; J. W. Dickson, S. R. Leonard, L. R. Smith, B. S. Stephenson, L. W. Williams.

Permit section.—J. S. Barclay, chief; G. H. Pyne, assistant.

Bureau of warehouse distribution.—Andrew Wheeler, chief; Philo B. Rhoades, assistant; Austin D. Smith, assistant.

Iron and steel scrap section.—William Vernon Phillips, chief.

Statistics.—Percy K. Withey, chief; Ernest L. Selden, assistant.

Stored materials section.—J. F. Wilkins, chief.

TEXTILE DIVISION.—John W. Scott, director; Henry B. Ashton, assistant.

Cotton and cotton linters section.—George R. James, chief; George W. Naumburg, assistant; Sherbourne Prescott, assistant.

Cotton goods section.—Spencer Turner, chief; Grosvenor Ely, assistant; George F. Smith, thread; Burton Etherington, yarn; Ralph E. Loper, mill equipment and production.

Felt section.—Sylvan Stroock, chief.

Flax products section.—George F. Smith, chief.

Knit goods section.—Lincoln Cromwell, chief; Rufus W. Scott, associate; F. E. Haight, associate; John McCauley, associate.

Rubber and rubber goods section.—H. T. Dunn, chief.

Silk section.—William Skinner, chief.

Domestic wool section.—Lewis Penwell, chief; William D. McKellar, assistant.

Foreign wool section.—A. M. Patterson, chief.

Woolens section.—Herbert E. Peabody, chief; A. L. Gifford, assistant.

Yarn section.—See Cotton goods section.

Tin section.—George N. Armsby, chief; James W. Hitchcock, assistant; Lincoln Hutchinson, assistant; Thomas G. Cranwell, assistant.

Tobacco section.—A. I. Esberg, chief.

Wire and Cable.—See Electric wire and cable section.

Wood products.— See Agricultural implements, etc., section.

Woolens section.— See Textile division.

Wool section.— See Textile division.

Yarn section.— See Textile division, cotton goods section.

News section, Committee on Public Information.— Stanley M. Reynolds,

A. O. Hayward.

APPENDIX V

REGIONAL ADVISORS

Region	Regional advisor — Address	Territory
No. 1, Boston Mass.	Stuart W. Webb, care of chamber of commerce.	Maine, New Hampshire, Vermont, eastern Massachusetts, Rhode Island.
No. 2, Bridgeport, Conn. . .	B. D. Pierce, jr., care of chamber of commerce.	Western Massachusetts, Connecticut.
No. 3, New York, N. Y. . .	Wm. Fellowes Morgan, care of Merchants' Association of New York.	Nine southeastern counties of New York, Long Island, and northern New Jersey.
No. 4, Philadelphia, Pa. . . .	Ernest T. Trigg, 1228 Widener Building.	Eastern Pennsylvania, southern New Jersey, Delaware.
No. 5, Pittsburgh, Pa.	George S. Oliver, care of chamber of commerce.	Western Pennsylvania, except Erie, Crawford, and Mercer Counties; Jefferson and Belmont Counties of Ohio; Alleghany, Garrett, and Washington Counties of Maryland; West Virginia.
No. 6, Rochester, N. Y. . . .	E. A. Fletcher, care of chamber of commerce.	New York State, except Metropolitan district, New York City.
No. 7, Cleveland, Ohio. . . .	W. B. McAllister, care of chamber of commerce.	Erie, Crawford, and Mercer Counties of Pennsylvania; northern Ohio, excepting Jefferson and Belmont Counties.
No. 8, Detroit, Mich.	Allan A. Templeton, care chamber of commerce.	Southern Michigan.
No. 9, Chicago, Ill.	D. E. Felt, 29 South La Salle Street.	Iowa, northern Illinois, and northern Indiana.
No. 10, Cincinnati, Ohio. . .	Edwin C. Gibbs, 31 East Fourth Street.	Southern Ohio, southern Indiana, and Kentucky.
No. 11, Baltimore, Md. . . .	F. S. Chavannes, care Merchants & Manufacturers Association.	Eastern Maryland, Virginia.
No. 12, Atlanta, Ga.	Edward H. Inman, care of chamber of commerce.	North Carolina, South Carolina, Georgia and Florida, excepting western tier of counties.
No. 13, Birmingham, Ala. . .	T. H. Aldrich, 322 Brown-Marx Building.	Tennessee, Mississippi, Alabama, western tier of counties in Florida, and southern Louisiana.
No. 14, Kansas City, Mo. . .	Franklin D. Crabbs, Tenth and Central Streets.	Utah, Wyoming, Colorado, northern New Mexico, northern Oklahoma, Kansas, Nebraska, and western strip of Missouri.
No. 15, St. Louis, Mo.	Jackson Johnson, care of chamber of commerce.	Missouri, Arkansas, and southern Illinois.
No. 16, St. Paul, Minn. . . .	D. R. Cotton, 1414 Pioneer Building.	Montana, North Dakota, South Dakota, Minnesota, and northwestern Michigan.
No. 17, Milwaukee, Wis. . .	August H. Vogel, fourth floor, city hall.	Southern Wisconsin.
No. 18, Dallas, Tex.	Louis Lipsitz, 407-9 Southland Life Building.	Texas, northern Louisiana, southeastern Oklahoma, southern New Mexico, and southeastern Arizona.
No. 19, San Francisco, Calif.	Frederick J. Koster, care of chamber of commerce.	California, Nevada, and Arizona, except southeastern counties in Dallas district.
No. 20, Seattle, Wash.	Herbert Witherspoon, care of chamber of commerce.	Washington, Oregon, and Idaho.
No. 21, Denver, Colo.	Cass E. Herrington, 510 Symes Building.	Colorado, Utah, Wyoming, and northern New Mexico.

APPENDIX VI

MEMBERS OF THE WAR INDUSTRIES BOARD ORGANIZATION

Name	Position in War Industries Board	Former business
Abbott, Arthur J.	Chief, questionnaire section . . .	Member law firm, Evans, Abbott & Pearce, Los Angeles, Calif. Baltimore, Md.
Abell, Chas. S.	Assistant section chief, priorities division.	
Adler, H. S.	Secretary of special representative of United States Railroad Administration with War Industries Board.	Secretary to vice president, Southern Ry. Co., Cincinnati, Ohio.
Aldrich, Lieut. H. R.	Nonferrous metals section.	Chief of field party and petrographer, Wisconsin Geographical Survey, Melrose, Mass.
Aldrich, H. W.	Staff, lumber section.	Sales manager, Hammond Lumber Co., Mill City, Oreg.
Aldrich, Truman H.	Regional advisor, Birmingham, Ala.	Mining engineer for city of Birmingham, Ala.
Alexander, Maurice M.	Assistant in platinum section . .	In charge of customers' room, John L. Dunlop & Co., Louisville, Ky.
Allen, Herbert B.	In charge Philadelphia branch building material division.	Secretary, Eastern Stone Producers' Association, Philadelphia, Pa.
Alsberg, Dr. Carl L.	Advisory board on medicinal agents, section of medical industry.	Chief Bureau of Chemistry, Department of Agriculture.
Anderson, Chandler P.	Special counsel on international affairs.	Law firm, Anderson & Anderson, New York, N. Y.
Anthony, Charles H.	Staff, resources and conversion section.	Export salesman, Detroit, Mich.
Anthony, Wm. A. R.	Assistant to chief, building material division.	Assistant to secretary, Master Builders Association, Boston, Mass.
Archer, Maj. P. F.	Requirements representative, Marine Corps.	Washington, D. C.
Armsby, George N.	Member priorities committee, chief in charge of tin.	Vice president, California Packing Corporation, San Francisco, Calif.
Ashton, Henry B.	Assistant to director, textile division.	Credit manager, Carson, Pirie, Scott & Co., Chicago, Ill.
Atwood, Lewis R.	Chief, paint and pigment section	President, Peaslee-Gaulbert Co., Louisville, Ky.
Averill, William A.	Expert, division of planning and statistics.	Inspector in elementary education, State Education Department, Albany, N. Y.
Aycock, Thomas J.	Lumber production director, Georgia and Florida.	General manager, the Aycock Lumber Co., Aycock, Fla.
Baggott, Capt. John C.	Examiner, Army section, priorities committee.	Purchasing agent and factory manager, McCormick Manufacturing Co., Dayton, Ohio.
Bailey, Thomas F.	Assistant to chief, hardware and hand-tool section.	Manager and treasurer, Banks Supply Co., Huntington, W. Va.
Baker, A. J.	Assistant, machine-tool section	Moseler Safe Co., Hamilton, Ohio.
Baker, Rhodes S.	Assistant priorities commissioner	Law firm, Thompson, Knight, Baker & Harris, Dallas, Tex.
Baldensperger, Capt. H. L.	Member war prison labor and national waste reclamation section.	Reclamation division, U. S. Army.
Bamberger, Capt. C.	Assistant chief, forgings, guns, etc., section.	Mining engineer, Salt Lake City, Utah.
Barber, William A.	Expert, price statistics.	Professor of commercial education, New York University.
Barbour, Henry H.	Member priorities committee . .	Manager of sales, Lackawanna Steel Co., New York, N. Y.
Barclay, James S.	Chief, permit section, steel division.	Trustee of an estate, New York, N. Y.
Barlow, De Witt D.	Associate chief, dredging section	Vice president and general manager, Atlantic Gulf & Pacific Co., New York, N. Y.
Barnes, M. H.	Assistant machine tool section . .	Henry Prentice Co., New York, N. Y.
Barnum, Harris W.	Gold and silver section of the chemical division.	Manager, Washington branch office, National Fireproofing Co.

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MEMBERS OF THE WAR INDUSTRIES BOARD ORGANIZATION

Continued

Name	Position in War Industries Board	Former business
Barsh, Waldo A.	Secretary to director of chemicals	Private secretary, C. H. MacDowell, Armour & Co., Chicago, Ill.
Bartley, George M.	Expert, steel division	Assistant sales manager, Cleveland Steel Co., Cleveland, Ohio
Baruch, Bernard M.	Chairman of the Board	New York, N. Y.
Bates, Frederic G.	Staff, central bureau of planning and statistics.	Partner, Bates & Gamble, Toledo, Ohio.
Bates, Henry M.do.	Dean of law school, University of Michigan.
Bayliss, Wm. G.	Expert, fire prevention section. .	Engineer, Ohio Inspection Bureau, Columbus, Ohio.
Beal, James H.	Member advisory committee on medicinal agents, section of medical industry.	Director of pharmacy research, University of Illinois.
Bean, Charles A.	Statistician, division of planning and statistics.	Salesman and office manager, Merrill Oldham & Co., bankers, Boston, Mass.
Beatty, William T.	Staff, conservation division. . . .	President and general manager, Austin Manufacturing Co., Chicago, Ill.
Becker, John A.	Assistant chief, nitrates section, chemical division.	Traveling auditor, Armour Fertilizer Works, Chicago, Ill.
Bell, Henry F.	Assistant to chief, inland traffic section.	General agent in Cuba Southern Ry. Co.
Bender, Allan P.	Expert, electric and power equipment section.	Commercial engineer, Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa.
Bender, Maj. John L.	Assistant in charge, Army section priorities committee.	President and general manager, Altoona Overland Co., Altoona, Pa.
Bergen, Charles Wm.	Expert, electric and power equipment division.	New York representatives of the Ford & Kendig Co., Philadelphia, Coffin Valve Co., Boston, et. al.
Betts, Morris C.	Assistant to director, building materials section.	Architect, office of Public Roads, Washington, D. C.
Bickford, Robert S.	Auditor, domestic wool section. .	Broker, Boston, Mass.
Bingham, Harry P.	Secretary War Industries Board, Aug. 1, 1917-Jan 1, 1918.	Cleveland, Ohio.
Birr, Charles H.	Comptroller, division of business administration.	C. P. A. Staff of Baker, Vawter & Wolf, Chicago, Ill.
Blanchard, Isaac H.	Chief, paper economics section, pulp and paper division.	President Isaac H. Blanchard Co., New York, N. Y.
Blankenship, Lieut. J. M.	Naval assistant.	Washington, D. C.
Bolt, Edward J.	Assistant to chief clerk, facilities division.	Sales manager, Twentieth Century Publishing Co., Philadelphia, Pa.
Bolton, Lieut. Col. C. C. . . .	Secretary and assistant to chairman, General Munitions Board, and chairman of clearance committee.	Secretary Bourne Fuller Co., Cleveland, Ohio.
Boniface, Addison O.	Expert fire prevention section. .	Superintendent of inspections, Underwriters Laboratories, Chicago, Ill.
Boom, Eugene C.	Examiner, priorities division . . .	Attorney at law, San Francisco, Calif.
Booth, George W.	Associate chief, fire prevention section.	Chief engineer, National Board of Fire Underwriters, New York, N. Y.
Bostwick, A. L.	Member purchasing commission	Secretary Planning Commission of St. Louis, Mo.
Boughton, Alice B.	Expert, price statistics, division planning and statistics.	Research expert, Home Economics, Bureau of Educational Experiments.
Bowler, Marian	Research assistant, division planning and statistics.	Instructor of French, Dedham, Mass.
Boyd, Henry W.	Expert, leather division, member foreign mission.	President Armour Leather Co., Chicago, Ill.
Brand, Charles J.	Chairman committee on cotton distribution.	Chief, Bureau of Markets, Department of Agriculture.
Brayton, Edward	Expert, cotton goods section. . .	Treasurer and cotton buyer, Towne, Brayton & Osborn, Fall River, Mass.
Brill, Geo. M.	Requirements division, emergency fleet representative.	140 North Broad Street, Philadelphia, Pa.
Brooker, Hubert H.	Secretary, foreign mission.	International Harvester Co., Chicago, Ill.

MEMBERS OF THE WAR INDUSTRIES BOARD ORGANIZATION

Continued

Name	Position in War Industries Board	Former business
Brookings, Robert S.	Chairman, price fixing committee	President, Washington University, St. Louis, Mo.
Brown, Alexander C.	Chief, crane section, assistant to commissioner of finished products.	President Brown Hoisting Machinery Co., Cleveland, Ohio.
Brown, George S.	Expert, cotton goods section....	Cost and Production Accountant, Ashland Cotton Co., Jewett City, Conn.
Bruning, H. F.	Staff, conservation division....	1029 Myrtle Street, Oakland, Calif.
Brunker, Albert R.	Chief, acids and heavy chemicals section.	President Liquid Carbonic Co., Chicago, Ill., and Atlantic Steel Casting Co., Chester, Pa.
Bryan, Allen W.	Statistician, division of planning and statistics.	Special Assistant Committee on Public Information, Washington, D.C.
Bryar, W. B.	Expert, hardware and hand tool section.	General manager Bailey-Farrel Manufacturing Co., Pittsburgh, Pa.
Buel, Hillhouse.	Expert, division of planning and statistics.	Lawyer, Seattle, Wash.
Bulkley, Robert J.	Chief, legal section.....	Law firm, Bulkley, Hauxhurst, Saeger & Jamieson, Cleveland, Ohio.
Bullard, Percy.	Expert, nonwar construction section.	Filor, Bullard & Smith, New York, N. Y.
Bulmahn, E. F.	Member resources and conversion section.	Vice president David G. Fisher & Co., Davenport, Iowa.
Burgess, William.	Expert, hardware and hand tool section.	First vice president, U. S. Potters' Association, Trenton, N. J., and East Liverpool, Ohio.
Burke, John H., jr.	Reporter.....	Court Reporter, Kalamazoo, Mich.
Burrowes, John F.	Expert, facilities division.....	Architect and Engineer, John I. Downey (Inc.), New York, N. Y.
Burwell, William R.	Division of planning and statistics.	Brown University, Providence, R. I.
Bush, Samuel P.	Director, facilities division, chief of the forgings, guns, etc., section.	President, Buckeye Steel Castings Co., Columbus, Ohio.
Butz, Theodore C.	Examiner, priorities division....	Lackner & Butz, Mortgage Investments, Chicago, Ill.
Callery, John B.	Assistant, resources and conversion section.	Vice president, Duquesne Fruit Co., Charter Oak, Calif.
Caminnetti, Anthony.	Member of war prison labor and national waste reclamation section.	Commissioner of Immigration, Department of Labor.
Campbell, John James	Nonferrous metals.	Morris Heights, New York, N. Y.
Canaday, Ward M.	Expert, nonwar construction section.	Advertising manager, Willys-Overland Co., Toledo, Ohio.
Carleton, R. H.	Associate chief, platinum section	Member of firm, Blodgett & Co., bond dealers, New York, N. Y.
Carmalt, James W.	Staff, central bureau of statistics	Chief examiner, Interstate Commerce Commission, Washington, D. C.
Carpenter, Gilbert E.	Expert, manufacturing section, pulp and paper division.	Director and sales manager, Carpenter Paper Co., Omaha, Neb.
Carr, James A.	Business manager, purchasing commission.	President, American Seeding Machine Co., Richmond, Ind., and Springfield, Ohio.
Carrell, Horace G.	Chief, alkali and chlorine section	Manager, technical service department, Solvay Process Co., Syracuse, N. Y.
Carroll, Chas. Wm.	Staff, facilities division.....	President and general manager, Twentieth Century Publishing Co., Philadelphia, Pa.
Case, Mills E.	Chief, contract section, division planning and statistics.	Statistician, New York City.
Catlett, Charles.	Chief, refractories section.....	Economic geologist and chemist; examiner of mineral properties, residence Staunton, Va.
Chamberlain, W. E.	Lumber section.....	John M. Woods Lumber Co., East Cambridge, Mass.
Chambers, Edward.	Priorities board, United States Railroad Administration representative.	Assistant Director General United States Railroad Administration, Washington, D. C.

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MEMBERS OF THE WAR INDUSTRIES BOARD ORGANIZATION

Continued

Name	Position in War Industries Board	Former business
Chandler, Willard D.	Expert, fire prevention section . .	Engineer and inspector, New England Bureau of United Inspection, Boston, Mass.
Channing, Henry M.	Chief, legal section	Law firm, Channing & Frothingham, Boston, Mass.
Chapin, Edward F., jr.	Examiner, priorities division . . .	District sales manager, Universal Portland Cement Co., Duluth, Minn.
Chappelear, Edgar S.	Expert, division of planning statistics.	Assistant general auditor, Bankers' Trust Co., New York, N. Y.
Charlton, Earle P.	Member of brass section	Vice president, F. W. Woolworth & Co., New York, N. Y.
Chase, March F.	Director, explosives division . . .	Vice president, Commercial Acid Co., St. Louis, Mo.
Chase, Wendell W.	Member, priorities committee . .	Consulting engineer, Boston, Mass.
Chatillon, George E.	Chief, military optical glass and instrument section.	President, John Chatillon & Sons, New York, N. Y.
Chavannes, Frank S.	Regional advisor, Baltimore . . .	President and treasurer, Chesapeake Iron Works, Baltimore, Md.
Chisholm, Charles K.	Assistant to chief, boot and shoe section, hides, leather, and leather goods division.	President, Chisholm Shoe Co., Cleveland, Ohio.
Clapp, A. W.	Chief of labor section, priorities division.	Attorney, St. Paul, Minn.
Clapp, Henry H.	Joint office on chemical statistics	In charge paper section, Bureau of Standards, Washington, D. C.
Clark, Arthur W.	Secretary to chief of nonwar construction section.	Private secretary to D. R. McLennan of Marsh & McLennan, Chicago, Ill.
Clark, Harold T.	Assistant to chairman, War Industries Board.	Attorney, member of firm, Squire, Sanders & Dempsey, Cleveland, Ohio.
Clark, Le Roy	Chief of electric wire and cable section.	President, Safety Insulated Wire & Cable Co., New York, N. Y.
Clark, Mancel T.	Staff, conservation division . . .	President, Wadsworth-Howland Co., Chicago, Ill.
Clayton, Wm. L.	Member of committee on cotton distribution.	Member of firm, Anderson, Clayton & Co., New York, N. Y.
Clos, Jean H.	Assistant to vice chairman of the War Industries Board.	Advertising manager, United States Copper Co., New York, N. Y.
Cobb, J. P.	Examiner, priorities division . . .	Salesman, Ernest Jacoby Co., Boston, Mass.
Coffin, John N.	Requirements division, shipping board representative.	Assistant secretary and treasurer, Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.
Collins, Walter G.	Expert, division of planning and statistics.	Plant superintendent, Union Lumber Co., Fort Bragg, Calif.
Colver, W. B.	Member, price fixing committee	Chairman, Federal Trade Commission.
Comstock, Louis K.	Assistant to chief of brass section	President, L. K. Comstock & Co., New York, N. Y.
Conner, Charles H.	Chief, platinum section, wood chemical section, and gold and silver section.	Associated with Kissel Kinnicut & Co., New York, N. Y.
Cook, Howard H.	Assistant to chief, tin section . .	Assistant secretary, American Iron & Steel Institute, New York, N. Y.
Cooke, Maj. A. M.	Lumber section	John L. Roper Lumber Co., Norfolk, Va.
Cooper, Carroll P.	Assistant special representative of United States Railroad Administration with War Industries Board.	Assistant to vice president, Southern Railway Co., Cincinnati, Ohio.
Copeland, Melvin T.	Executive secretary, conservation division.	Director of bureau of business research, Harvard University.
Corcoran, Lieut. Edward T.	Private secretary, B. M. Baruch	Mechanicsville, N. Y.
Corey, A. A.	Expert, steel division	Assistant general superintendent, Youngstown Sheet & Tube Co., Youngstown, Ohio.
Cornell, Irwin H.	Expert, nonferrous metals section foreign mission.	Vice president, St. Joseph Lead Co., New York, N. Y.
Cotton, Donald R.	Regional advisor, St. Paul, Minn.	District sales manager, Illinois Steel Co., St. Paul, Minn.

MEMBERS OF THE WAR INDUSTRIES BOARD ORGANIZATION

Continued

Name	Position in War Industries Board	Former business
Coulter, John Lee.....	Expert, division of planning and statistics.	Dean of college of agriculture, University of West Virginia.
Cover, Ralph.....	Assistant to secretary priorities committee.	Attorney at law, Baltimore, Md.
Cover, Thomas, jr.	Chief, sole and belting leather section, hides, leather and leather goods division.	Partner, Cover & Co., sole leather, Philadelphia, Pa.
Cowperthwaite, Mortimer T.	Secretary to H. R. Rea, special advisory committee on plants and munitions.	Secretary to H. R. Rea, Pittsburgh, Pa.
Crabbs, Franklin D.....	Regional advisor, Kansas City, Mo.	Owner, the Union Bank Note Co., Kansas City, Mo.
Cragin, B. A., jr.....	Lumber section.....	Watkin-Gray Lumber Co., Hattiesburg, Miss.
Craig, Joseph W.....	Platinum section of chemical division.	Southern Railway Co., Washington, D. C.
Cranwell, Thomas G.....	Assistant to chief, tin section...	President, Continental Can Co., New York, N. Y.
Crawford, Everett L.	Assistant to commissioner of finished products.	Crawford, Patton & Cannon, bankers, New York, N. Y.
Crockett, Arthur E.....	Assistant chief, chain section...	Sales manager, chain department, Jones & Laughlin Steel Co., Pittsburgh, Pa.
Crockett, Ernest D.	Assistant, machine tool section	Sales engineer, Henry Prentiss & Co., Springfield, Mass.
Cromwell, Lincoln.....	Chief, knit goods section.....	Member of firm of Williams Iselin & Co., New York, N. Y.
Curran, John H.....	Staff, conservation division.....	Lawyer, Chicago, Ill.
Cutter, John.....	do.....	Head of trading department, Harris-Forbes & Co., Boston, Mass.
Daggett, Stuart.....	Expert, division of planning and statistics.	Professor, University of California.
Dame, Frank L.....	Member of facilities division...	Consulting engineer, Harrison Williams, New York, N. Y.
Damon, Maj. John C.	Expert, power section.....	Assistant chief engineer, Utah Power & Light Co., Salt Lake City, Utah.
Danforth, Mary L.....	Expert, division planning and statistics.	Manufacturer, Milwaukee, Wis., and Indianapolis, Ind.
Darling, Ira C.....	Chief, creosote section.....	President, Bartholomay & Darling, Chicago, Ill.
Darlington, Frederick.....	Chief, power section.....	Consulting engineer, New York, N. Y.
Daughterty, Paul R.....	Chief, war contract section.....	Employment expert, Pennsylvania State Department of Labor, Philadelphia, Pa.
Davis, Charles B.....	Assistant to chief, power section	Manager of Boston office, General Electric Co.
Davis, Chas. J.....	Assistant to chief clerk.....	Democrat and Chronicle, Rochester, N. Y.
Davis, Leon K.....	Expert, fire prevention section...	Engineer inspector, Fireman's Mutual Fire Insurance Co., Detroit, Mich.
Day, E. E.....	Staff central bureau of planning and statistics.	Assistant professor, Harvard University.
De Leeuw, M. H.....	Assistant, machine tool section...	Singer Manufacturing Co., Elizabethport, N. J.
De Nike, George E.	Associate chief, platinum section	Purchase and sales department, Graves Maubert, George & Co., wholesale lumber, New York, N. Y.
Dennison, Henry S.....	Assistant chairman, central bureau of planning and statistics.	President, Dennison Manufacturing Co., Framingham, Mass.
Dickinson, G. V.....	Staff, conservation division.....	General agent, Elgin National Watch Co., Elgin, Ill.
Dickson, George R.....	Assistant to secretary priorities committee.	Sales and advertising manager, Shannon & Luchs, real estate, Washington, D. C.
Dickson, J. W.....	Expert, steel division.....	Salesman, Edmund W. Mudge Co., Pittsburgh, Pa.
Dillon, Clarence.....	Assistant to chairman, War Industries Board.	Member of firm, Wm. A. Reed & Co., bankers, New York, N. Y.
Ditfurth, W. L.....	Assistant, machine tool section...	Hill-Clarke Co., Chicago, Ill.
Dizer, Malcolm C.....	Staff, conservation division.....	Foreign sales manager, Dennison Manufacturing Co., Framingham, Mass.

MEMBERS OF THE WAR INDUSTRIES BOARD ORGANIZATION

Continued

Name	Position in War Industries Board	Former business
Dodd, E. Merrick, jr.	Member, legal section	Professor of law, Washington and Lee University, Lexington, Va.
Doll, Lieut. E. G.	Statistics, chemicals division	Foreign exchange department, National City Bank, New York City.
Donlin, John	Emergency construction committee.	President, building trades department American Federation of Labor, Chicago, Ill.
Donnelley, Thomas E.	Director of pulp and paper division.	President, R. R. Donnelley Sons Co., Chicago, Ill.
Doten, Carroll W.	Expert, central bureau of planning and statistics.	Professor, Massachusetts Institute of Technology.
Dowd, Charles F.	Expert, nonwar construction section.	Arkonberg-Machine-Dowd Co., 512 Produce Exchange, Toledo, Ohio.
Downey, James E.	Staff, central bureau of planning and statistics.	Head master, Boston High School of Commerce.
Downey, John L.	Member, facilities division	President and general manager, John I. Downey (Inc.), New York, N.Y.
Downman, R. H.	Lumber section	Cypress, New Orleans, La.
DuBois, Capt. Henry C.	Chief, electrodes and abrasives section.	Assistant secretary, E. J. Levino & Co., Philadelphia, Pa.
Dumm, A. A.	Assistant, priorities division	Southwestern sales agent, Sabine Lumber Co. (St. Louis), Houston, Tex.
Dunn, Harry T.	Chief, rubber section	President Fisk Rubber Co., Chicopee Falls, Mass., and Federal Rubber Co., Cudahy, Wis.
Dunning, Lieut. Ray P.	Navy representative, joint office on chemical statistics.	Engineer, Springfield, Mass.
Eames, Frank W.	Expert, fire prevention section	Inspector-engineer, Factory Insurance Association, Hartford, Conn.
Easton, Harry M.	Assistant chief of tin section	General sales manager, Weirton Steel Co., Weirton, W. Va.
Eaves, Frederick B.	Expert, electrical and power equipment section.	Assistant general sales manager, Bryant Electrical Co., Bridgeport, Conn.
Edgar, Charles	Director of lumber	Retired from business, Essex Fells, N. J.
Edgerly, Hial Stephen	Assistant secretary War Industries Board	First vice president, the Theodor Kundtz Co., Cleveland, Ohio.
Einig, Alvin B.	Assistant chief, machine tool section.	Sales engineer, Motch & Merryweather Machinery Co., Cleveland, Ohio.
Eisendrath, William B.	Chief, upper, harness, bag, and strap leather section.	Secretary, Monarch Leather Co., Chicago, Ill.
Elton, John P.	Adviser, brass section	Vice president, American Brass Co., Waterbury, Conn.
Ely, Grosvenor	Assistant to chief cotton goods section.	Treasurer, Ashland Cotton Co., Norwich, Conn.
Ely, Lieut. M. G.	Examiner, Army section, priorities committee.	Branch manager, Horace S. Ely & Co. (real estate), New York, N. Y.
Emerson, Kenneth Bales	Expert, division of planning and statistics.	Statistician, Sanderson & Porter, New York, N. Y.
Esberg, Alfred I.	Chief, tobacco section	Retired, Mountain View, Calif.
Estabrook, H. M.	Assistant chief, railway equipment and supply section.	President Barney-Smith Car Co., Dayton, Ohio.
Estes, Col. George H.	Requirements division	Army representative, Washington, D. C.
Etherington, Burton	Chief, yarn section	Member of firm, Franklin Oliver & Co., New York, N. Y.
Ettinger, A.	Member legal section	Lawyer, Cleveland, Ohio.
Evans, Henry	Chairman advisory committee, fire prevention section.	President, Continental Insurance Co.
Farroat, H. B.	Passenger representative, inland traffic section.	Passenger agent, Baltimore & Ohio R. R., Washington, D. C.
Felt, Dorr E.	Regional advisor, Chicago	President, Felt & Tarrant Manufacturing Co., Chicago, Ill.
Fenner, David C.	Assistant chief, automotive product section.	Sales engineer, International Motor Co., New York, N. Y.
Ferguson, George K.	Chief clerk, pulp and paper division.	Cost accountant and chemist, Watervliet Paper Co., Watervliet, Mich.
Ferguson, L. Perry	Storekeeper, division of business administration.	Salesman, Safe Cabinet Co., Marietta, Ohio.

MEMBERS OF THE WAR INDUSTRIES BOARD ORGANIZATION

Continued

Name	Position in War Industries Board	Former business
Field, Herbert E.....	Assistant chief, acids and heavy chemicals section, chemical division.	President and general manager, Wheeling Mould & Foundry Co., Wheeling, W. Va.
Fisher, Capt. Boyd.....	Government supervisor employment management courses, Federal Board of Vocational Education.	Washington, D. C.
Fisher, Frank E.....	Chief, bureau applications and issue, priorities division.	Manufacturing for self, Detroit, Mich.
Flanders, Ralph E.....	Assistant, machine tool section.	Jones & Lampson Machine Co., Springfield, Vt.
Flannery, Lieut. Col. J. Rogers.	Chief, railway equipment and supply section.	President, Flannery Bolt Co., Pittsburgh, Pa.
Fleming, Frances.....	Secretary to H. P. Ingels.....	Washington, D. C.
Fletcher, Eston A.....	Regional advisor, Rochester, N. Y.	Member of firm, Phelps & Fletcher, Rochester, N. Y.
Fletcher, Rear Admiral Frank F.	Member, War Industries Board and priorities board.	Washington, D. C.
Foerderer, Percival E.	Vice chairman, employment management courses.	President and general manager, Robert H. Foerderer (Inc.), Philadelphia, Pa.
Follansbee, William B.	Assistant to southern lumber administration, lumber section.	Part owner, Marion Lumber Co., Hattiesburg, Miss.
Foote, Edith L.....	Assistant to secretary priorities committee.	Yonkers, N. Y.
Foster, Charles K.....	Vice chairman, priorities committee.	Vice president, American Radiator Co., Chicago, Ill.
Foster, Maj. Clair.....	Emergency construction section	Great Barrington, Mass.
Foster, Mortimer B.....	Chief, miscellaneous commodities section.	Treasurer and director, Shield Electric Co., New York, N. Y., and Southern Export Corporation, New York, N. Y.
Frank, Lawrence K.....	Expert, division of planning and statistics.	Accountant, New York Telephone Co., New York, N. Y.
Frankfurter, Felix.....	Priorities board, labor representative	Labor Department, Washington, D. C.
Fraser, W. Hugh.....	Assistant, facilities division.....	Traveling salesman, Peerless Motor Car Co., Cleveland, Ohio.
Frayne, Hugh.....	Chairman, labor division.....	General organizer, American Federation of Labor, New York, N. Y.
Freeman, E. Stewart.....	Expert, central bureau of planning and statistics.	Cost accountant, Dennison Manufacturing Co., Framingham, Mass.
Freeman, M. B.....	Staff, conservation division.....	General sales manager, Dennison Manufacturing Co., Framingham, Mass.
Friedberg, Ralph J.....	Draftsman, building material division.	Architect, Akron, Ohio.
Friedlich, H. A.....	Member legal section.....	Lawyer, Des Moines, Iowa.
Frost, Edward J.....	Staff, central bureau of planning and statistics.	Vice president, Wm. Filene Sons & Co., Boston, Mass.
Garfield, Dr. H. A.....	Member of price fixing committee.	Chairman Fuel Administration.
Garrett, Paul W.....	Expert, price statistics.....	Supervisor of researches, Bureau of State Research, Newark, N. J.
Gary, Julian Vaughn.....	Secretary to Gov. H. C. Stuart.	Counsel, State Tax Board, Richmond, Va.
Gault, P. B.....	Secretary, foreign mission.....	City passenger agent, B. & O. R. R., Louisville, Ky.
Gay, Edwin F.....	Chairman of the central bureau of planning and statistics.	Dean of graduate school of business administration, Harvard University.
Gay, Edward Randolph.....	Staff, central bureau of planning and statistics.	Student, Harvard University.
Gibbs, Edwin C.....	Regional advisor, Cincinnati, Ohio	Retired.
Gibbs, Louis D.....	Staff, division of planning and statistics.	Superintendent advertising department, Edison Electric Illuminating Co., Boston, Mass.
Gifford, A. L.....	Assistant to chief, woolen section	Sales agent, Worumbo Co., New York, N. Y.
Gilbert, H. N.....	Expert, electric and power equipment section.	Assistant to president, Rothe Bros. & Co., Chicago, Ill.
Gillen, Martin J.....	Assistant to commissioner finished products.	President, Mitchell Wagon Co., Racine, Wis., et al.

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MEMBERS OF THE WAR INDUSTRIES BOARD ORGANIZATION

Continued

Name	Position in War Industries Board	Former business
Gillman, Joseph W.	Division planning and statistics	Emergency Fleet Corporation, Philadelphia, Pa.
Gladding, Augustus L.	Assistant to director, building material division.	Assistant to general superintendent, Gladding, McBean & Co., Lincoln, Calif.
Glenn, John F.	Expert, electric and power equipment section.	New England sales manager, Edgemoor Iron Co., Boston, Mass.
Goddard, Horace M.	Staff, central bureau of planning and statistics.	President, Advertiser Special Service Corporation, New York, N. Y.
Goethals, Maj. Gen. George W.	Member War Industries Board and priorities board.	Consulting engineer, New York, N. Y.
Goldman, Lieut. J. B., U. S. Navy.	Member war prison labor and national waste reclamation section.	Washington, D. C.
Goldsmith, Margaret L.	Expert, war industries abroad, division planning and statistics.	Graduate student, University of Illinois.
Goodfellow, William E.	Assistant business manager, division of business administration.	Manager personal estate, Minneapolis, Minn.
Goodwillie, George L.	Expert, fire prevention section. . .	Inspector, Western Factory Insurance Association, Chicago, Ill.
Gordon, Lieut. M. R.	Army representative, joint office on chemical statistics.	Manager, foreign exchange purchase department, National City Bank, New York, N. Y.
Gower, H. R.	Member legal section.	Associate, law firm Hamilton & Hamilton, Washington, D. C.
Graff, Everett D.	Special agent, steel division . . .	Assistant to vice president, Joseph T. Ryerson & Son, Chicago, Ill.
Gramlick, Howard.	Wool section.	University of Nebraska, Lincoln, Nebr.
Granger, Capt. A. H.	Emergency construction committee.	Granger & Young, architects, Chicago, Ill.
Greenburg, Max.	Expert, electric and power equipment.	Manager, erecting and service department, Worthington Pump & Machine Co., New York, N. Y.
Greenbaum, Charles Jay.	Assistant to secretary, War Industries Board.	Student, Yale University; residence, Chicago, Ill.
Grimes, Howard S.	Requirements division shipping board representative.	Catonsville, Md.
Grothaus, L. W.	Electric and power equipment section, in charge turbine division.	Sales engineer, Allis-Chalmers Manufacturing Co., Milwaukee, Wis.
Guffey, Joseph F.	Chief, petroleum section.	Pittsburgh, Pa.
Guylee, W. E.	Executive secretary, requirements division.	Vice president, Cable Piano Co., Chicago, Ill.
Gwathmey, J. Temple.	Member committee on cotton distribution.	Retired, New York, N. Y.
Haight, Frederick E.	Associate chief, knit goods section.	Managing partner, A. S. Haight & Co., New York, N. Y.
Hale, Robert S.	Staff, central bureau of planning and statistics.	Superintendent of special research, Edison Electric Illum. Co., Boston, Mass.
Haley, Edwin J.	Chief, tanning material and natural dye section (including oils, fats, and waxes).	President, Haley-Hammond Co., New York, N. Y.
Hall, Jay V.	Staff, central bureau of planning and statistics.	Interests in eastern oil and gas fields, Pinehurst, N. C.
Halladay, Calvin L.	Assistant chief, automotive products section.	Engineer, Lewis Spring & Axle Co., Chelsea, Mich.
Hall, Marcus Brown.	Assistant secretary, priorities committee.	Purchasing agent, American Box Board Co., Grand Rapids, Mich.
Hamilton, C. D. P.	Chief, boot and shoe section. . .	Vice president, International Shoe Co., St. Louis, Mo.
Hamilton, James.	Expert, fire prevention section. .	Fire protection engineer, Underwriters' Bureau of the Middle and Southern States, New York, N. Y.
Hanch, Charles C.	Chief, automotive products section.	Treasurer, Studebaker Corporation, South Bend, Ind.
Hancock, Commander John M.	Navy representative on price fixing committee.	Grand Forks, N. Dak.
Hansen, John M.	Member and secretary of advisory committee on plants and munitions.	President Standard Steel Car Co., Pittsburgh, Pa.

MEMBERS OF THE WAR INDUSTRIES BOARD ORGANIZATION

Continued

Name	Position in War Industries Board	Former business
Hardy, Maj. R. S.	Expert, power section.	Electrical engineer, Los Angeles Gas & Electrical Co., Los Angeles, Cal.
Harrison, Francis G.	Assistant to secretary, price fixing committee.	President, Western Motor Car Co., Cincinnati, Ohio.
Harman, S. Park.	Employment management division.	45 Kenwood Avenue, Rochester, N. Y.
Hart, Dudley N.	Domestic wool section.	Hallowell, Jones & Donald, Boston, Mass.
Hartigan, Lieut. Commander Charles.	Member war prison labor and national waste reclamation section.	Judge Advocate General's Office, Navy Department.
Hatfield, Henry R.	Director of the division of planning and statistics.	Professor of accounting, and dean, University of California.
Hawk, Judge M.	Assistant chief, manufacturing section, pulp and paper division.	Sales manager and purchasing agent, Gaw O'Hara Envelope Co., Chicago, Ill.
Hawley, H. W.	Assistant, inland traffic section.	Division freight agent, Erie R. R. Co., New York, N. Y.
Hawley, John C.	Expert, fire prevention section.	Inspector, Associated Factory Mutual Fire Insurance Co., Boston, Mass.
Hay, Richard C.	Staff, central bureau of planning and statistics.	Organization manager, Retail Research Association, New York, N. Y.
Hayes, Lieut. Col. Henry R.	Requirements division, Army representative.	In charge New York office Stone & Webster, 120 Broadway, New York, N. Y.
Hayward, Nathan.	Associate chief, dredging section	President, American Dredging Co., Philadelphia, Pa.
Heacock, J. Linden.	Staff, conservation division.	Member of firm, Heacock & Hokabson, Philadelphia, Pa.
Heibel, Lieut. W. E.	Expert, power section.	Mechanical engineer, American Blower Co., Detroit, Mich.
Heidrich, Edw. C., jr.	Chief, jute, hemp and cordage section.	Vice president and manager, Peoria Cordage Co., Peoria, Ill.
Henderson, James D. C.	Expert, wool section.	Wool merchant, Philadelphia, Pa.
Henn, Lieut. Ralph F.	Examiner, Army section, priorities committee.	National Acme Co., Cleveland, Ohio.
Herbst, Edith G.	Bulletins division of planning statistics.	Editor, Official Bulletin, University of Minnesota.
Hennessey, William H., jr.	Statistician, hides, leather and leather goods division.	Circulation manager, Boot & Shoe Recorder, Boston, Mass.
Herbert, Edith G.	Bulletins, division of planning and statistics.	Editor Official Bulletin, University of Minnesota.
Herrington, Cass E.	Regional advisor, Denver.	Attorney, Denver, Colo.
Hickey, Edward J.	Assistant chief, automotive products section.	Assistant clerk, Committee on Military Affairs, United States Senate.
Hickox, Raymond.	Expert, purchasing committee. .	Assistant manager, Proctor & Gamble, Cincinnati, Ohio.
Hildreth, Chas. E.	Assistant, machine tool section. .	Whitcomb-Blaisdell Co., Worcester Mass.
Hill, Norman H.	Assistant to director, building and materials division.	Graham & Hill, Indianapolis, Ind.
Hiller, George F.	Expert, fire prevention section. .	Vice president, What Cheer Mutual Fire Insurance Co., Providence, R. I.
Hirsch, Maurice.	Secretary priorities committee. .	Attorney at law, Houston, Tex.
Hitchcock, James W.	Assistant to chief, tin section. . .	General manager, I. Sulzbacher Co., Steubenville, Ohio.
Hoagland, Ira O.	Expert, fire prevention section. .	Secretary-treasurer, National Automatic Sprinkler Association, New York, N. Y.
Holbrook, Percy.	Member priorities committee. .	Vice president, the Rail Joint Co., New York, N. Y.
Holloran, D. A.	Expert, steel division.	Clerk, sales department, La Belle Iron Works, Steubenville, Ohio.
Holsinger, Walter.	Organization expert.	Attorney, Minneapolis, Minn.
Hopkins, James M.	Member priorities committee. .	Chairman of board, Camol Co., Chicago, Ill.
Hopkins, Louis Jay.	Assistant, conservation division	Managing partner, Swallow & Hopkins, lumber manufacturers, Duluth, Minn.

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MEMBERS OF THE WAR INDUSTRIES BOARD ORGANIZATION

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Name	Position in War Industries Board	Former business
Horr, John W.....	Expert, steel division.....	Assistant district manager, Bethlehem Steel Co., Boston, Mass.
Houck, Lieut. Roland J...	Assistant, machine tool section..	Motch & Merryweather Machinery Co., Cleveland, Ohio.
Hough, Geo. A., jr.....	Assistant to H. B. Swope.....	Writer, New York World.
Howe, Owen C.....	Chief, foreign skins and hides section.	Partner, Sands & Lockie, Boston, Mass.
Howell, Frank B.....	Assistant to director, building materials division.	American Radiator Co., New York, N. Y.
Hubbard, G. M.....	Assistant to secretary, priorities committee.	Sales manager, Howe, Snow, Corrigan & Bertles, investment bankers, Grand Rapids, Mich.
Hubbard, Russell S. ¹	Deceased, former chief of paint and pigment section.	Philadelphia, Pa.
Hughes, Claire B.....	Assistant secretary, clearance committee.	Attorney, Marshall & Fraser, Toledo, Ohio.
Hughes, John.....	Foreign mission.....	American Iron & Steel Institute, New York, N. Y.
Hughes, M. M.....	Expert, electric and power equipment section.	Sales engineer, General Electric Co., Schenectady, N. Y.
Hughes, Morgan O.....	Wool section.....	University of Kentucky, Bowling Green, Ky.
Hughes, Thomas W.....	Hide, leather, and tanning section.	608 Continental Building, Baltimore, Md.
Humphrey, Richard L....	Director, building materials division.	Consulting engineer, Philadelphia, Pa.
Hunter, Lois B.....	Committee on comfort and welfare.	Washington, D. C.
Hutchinson, Lincoln.....	Foreign mission.....	Professor of commerce, University of California.
Huyck, E. N.....	Expert, felt section.....	Member of firm, F. C. Huyck & Sons, Albany, N. Y.
Ingels, Howard P.....	Secretary, War Industrial Board	Second vice president, Realty Guaranty & Trust Co., Youngstown, Ohio.
Inglis, James.....	Member requirements division..	President, American Blower Co., Detroit, Mich.
Inman, Edw. H.....	Regional advisor, Atlanta.....	Inman, Howard & Inman, Atlanta, Ga.
Jackson, Edwin E., jr....	Special representative, finished products division.	President and treasurer, Boorum & Pease, Brooklyn, N. Y.
Jackson, Lewis B.....	Chief, domestic skins and hides.	Chief, hide department, W. H. McElwain Co., shoe manufacturers, Boston, Mass.
James, A. E.....	Statistician, division planning and statistics.	Tax expert, Taxpayers' Association, Santa Fe, N. Mex.
James, Geo. R.....	Chief, cotton and cotton linters section.	President, Wm. R. Moore Dry Goods Co., Memphis, Tenn.
James, Wm. S.....	Expert, electrical and power equipment section.	Salesman, Crouse-Hinds Co., Syracuse, N. Y.
Jenkins, Frederick W.....	Staff, division planning and statistics.	Director of publications, Russell Sage Foundation, New York, N. Y.
Jensen, A. G.....	Secretary to G. N. Peek.....	Sales department, Deere & Co., Moline, Ill.
Johnson, Alvin S.....	Special agent, division planning and statistics.	Editorial writer, the New Republic, New York, N. Y.
Johnson, Brig. Gen. Hugh S.	Member War Industries Board, Army representative.	Washington, D. C.
Johnson, Jackson.....	Regional advisor, St. Louis....	Retired.
Jones, Edw. D.....	Director of course materials, employment management courses.	Professor of commerce and industry, University of Michigan.
Jones, Eliot.....	Staff, central bureau planning and statistics.	Associate professor of economics, Leland Stanford Junior University.
Jones, John D.....	Executive secretary, war prison labor and national waste reclamation section.	Assistant manager, International Correspondence Schools, Scranton, Pa.

¹Russell Sturgis Hubbard, chief of the Paint and Pigment Section, died in the service of his country on November 5, 1918. He had come to Washington with full knowledge that because of his health the supreme sacrifice was not unlikely, and he carried on to the end with the finest courage.

MEMBERS OF THE WAR INDUSTRIES BOARD ORGANIZATION

Continued

Name	Position in War Industries Board	Former business
Jones, Walter Clyde.....	Counsel for nonwar construction section.	Law firm, Jones, Addington, Ames & Seibold, Chicago, Ill.
Joy, Harold E.....	Expert, rubber section.....	Expert, B. F. Goodrich Co., Akron, Ohio.
Justus, Allen L.....	Expert, lumber section.....	Partner manager, J. Natwick & Co., Baltimore, Md.
Kean, David L.....	Assistant to chief, section on medical industry; chief, surgical instruments and hospital equipment, section of medical industry.	General manager, Chas. Lentz & Sons, Philadelphia, Pa.
Kearns, Percy H.....	Secretary, legal section.....	Secretary to Oscar L. Gray, M.C.
Kellenberger, Max W.....	Reporter.....	Stenotypist, Galbraith & Compton, oil producers, Independence, Kan.
Kelley, Geo. E. C.....	Auditor, rubber section.....	Cost auditor, Fisk Rubber Co., Chicopee Falls, Mass.
Kendall, Frank A.....	Statistician, building materials division.	Architect, 45 Bromfield Street, Boston, Mass.
Kerr, Clarence D.....	Secretary, clearance committee..	Attorney, 5 Nassau Street, New York, N. Y.
Kerr, Karl S.....	Crane section.....	Fort Myer Heights, Va.
Kilpatrick, Maj. J. R.....	Emergency construction committee.	Thompson-Starrett Co., building construction, New York, N. Y.
King, Victor L.....	Chief, artificial dyes and intermediates section.	Consulting chemical engineer, Wood Ridge, N. J.
Kirkpatrick, C. C.....	Expert, nonwar construction section.	Publicity man, Chicago, Ill.
Kittredge, Lewis H.....	Member facilities division.....	President, Peerless Motor Car Co., Cleveland, Ohio.
Kling, John A.....	Assistant, resources and conversion section.	President, Kelly Island Lime Co., Cleveland, Ohio.
Klock, Lena M.....	Assistant business manager, division planning and statistics.	Secretary to business manager, Regal Shoe Co., Boston, Mass.
Knight, Thos. S.....	Electrical and power equipment section, in charge of electrical department.	Head of switchboard department, General Electric Co., Boston, Mass.
Knight, W. Hughes.....	Assistant to secretary, priorities committee.	Attorney at law, Dallas, Tex.
Knobel, John E.....	Director, division of business administrator.	Manager personal estate, Chicago, Ill.
Koch, William C.....	Assistant, resources and conversion section.	Vice president Twin City Brick Co., St. Paul, Minn.
Koster, Frederick J.....	Regional advisor, San Francisco	President, California Barrel Co., San Francisco, Calif.
Kratz, John A.....	Assistant to vice chairman, War Industries Board, in charge of cablegrams.	Practicing attorney, Charles Henry Butler, Washington, D. C.
Krohn, Irwin.....	Expert, boot and shoe section...	Partner in Krohn, Fechtheimer & Co., Cincinnati, Ohio.
Krumb, Henry.....	Member of priorities committee.	Consulting mining engineer, Salt Lake City, Utah.
Kurt, Franklin T.....	Staff, division planning and statistics.	Owner of Chauncey Hall School, Boston, Mass.
Lacombe, Maj. C. F.....	Expert, power section.....	Electrical engineer, New York, N.Y.
Lamar, Capt. Robt. W.....do.....	Electrical superintendent, Central Power Co., Canton, Ohio.
Lambert, Howard S.....	Superintendent of buildings, division of business administration.	Chief clerk, Central Railroad of New Jersey, Jersey City, N. J.
Lamond, William S.....	Priorities committee.....	Simplex Wire & Cable Co., Boston, Mass.
Lamson, Frederick L.....	Staff, central bureau of planning and statistics.	Treasurer, Norwalk Tire & Rubber Co., Norwalk, Conn.
Law, W. E.....	In charge Norfolk branch building materials division.	Sales manager, Clinchfield Portland Cement Co., Kingsport, Tenn.
LaWall, Charles N.....	Member advisory committee, medical agents, section of medical industry.	Dean, Philadelphia College of Pharmacy, Philadelphia, Pa.
Lawless, Matthew D.....	Examiner, priorities division....	Lawless Bros., paper mills, East Rochester, N. Y.
Leddy, James C.....	Assistant to business manager, purchasing committee.	District auditor, Armour & Co., Chicago, Ill.

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MEMBERS OF THE WAR INDUSTRIES BOARD ORGANIZATION *Continued*

Name	Position in War Industries Board	Former business
Lee, John W., jr.....	Expert, nonwar construction section.	President and manager, Overland Syracuse Co., Syracuse, N. Y.
Lee, William L.....	Expert, fire-prevention section..	Inspector, Underwriter Service Association, Chicago, Ill.
Legge, Alex.....	Vice chairman, War Industries Board; chairman, requirements division.	Vice president and general manager, International Harvester Co., Chicago, Ill.
Leith, C. K.....	Chief, mica section, and advisor in relation to mineral exports and imports.	Professor of geology, University of Wisconsin, Wis.
Lengel, Wm. C.....	Publication work, employment management courses.	Publicity department, Hoggson Bros. New York, N. Y.
Lennihan, Richard	Staff, conservation division.....	Salesman, Lee, Higginson Co., Boston, Mass.
Leonard, Geo. M.....	Conservation division.....	Ellis Title & Conveyancing Co., Springfield, Mass.
Leonard, Stephen R.....	Expert, steel division.....	Second vice president, Oneida Community (Ltd.), Oneida, N. Y.
Letts, F. C.....	Requirements division.....	Red Cross representative, Red Cross Headquarters, Washington, D. C.
Lewenberg, Harry L.	Staff, division of planning and statistics.	Assistant to vice president, St. Louis Car Co., St. Louis, Mo.
Lewis, George.....	Assistant, gold and silver section	President, Shreve & Co., San Francisco, Calif.
Lewis, Henry S.....	Priorities committee.....	Pittsburgh, Pa.
Leyden, Maj. H. R.	Expert, power section.....	Consulting engineer, New York, N. Y.
Lincoln, Alfred L.....	Expert, hardware and hand tool section.	Retired, Taunton, Mass.
Lipps, Louis P.....	Secretary, crane section.....	Engineer with Brown Hoisting Machinery Co., Cleveland, Ohio.
Lipnitz, Louis.....	Regional advisor, Dallas.....	Business for self, Dallas, Tex.
Lively, E. W.....	Expert, hardware and hand tool section.	Southern representative, L. S. Starrrett Co., Athol, Mass.
Lodge, David M.....	Assistant, woollens section.....	Treasurer, John T. Lodge & Co., Boston, Mass.
Long, Walter F.....	Emergency construction committee.	Boston, Mass.
Loper, Ralph E.....	Expert, cotton goods section ..	Consulting industrial engineer, Fall River, Mass.
Louis, Harry J.....	Chief, gloves and leather clothing section, hide, leather and leather goods division.	Manager, Bachner, Moses, Louis Co., Gloversville, N. Y.
Lovell, Raymond L.....	Expert, steel division.....	Broker, New York, N. Y.
Lovett, Robert S.....	Priorities Commissioner, retired	
Lowe, George A.....	Expert, fire prevention section..	Special inspector and engineer, New England Insurance Exchange, Boston, Mass.
Lowell, Floyd C.....	Assistant, machine tool section..	Sales engineer, Henry Prentiss & Co., Buffalo, N. Y.
Lowery, Frank A.....	Deceased; steel division.....	Bethlehem Steel Co., South Bethlehem, Pa.
Lubin, Isadore.....	Expert, division planning and statistics.	Instructor in economics, University of Missouri, Columbia, Mo.
Lucas, George L.....	In charge New York branch building materials division.	Inspector, Public Service Commission, New York, N. Y.
Lundoff, C. W.....	Chairman, emergency construction committee.	President, Crowell Lundoff-Little Co., Cleveland, Ohio.
Lyman, Clarence M.....	Assistant to director, building materials division.	Manager, sales and publicity, International Heater Co., Utica, N. Y.
Lynn, Charles J.....	Associate chief, section of medical industry.	Secretary and general manager, Eli Lilly & Co., Indianapolis, Ind.
McAllister, William B.....	Regional advisor, Cleveland....	President, W. B. McAllister Co., Cleveland, Ohio.
McCauley, John S.....	Assistant chief, knit goods section.	President and manager, Cumberland Dry Goods & Notion Co., Cumberland, Md.
McCullough, Wm. E.....	Member of advisory committee on plants and munitions.	Cost clerk, Standard Steel Car Co., Butler, Pa.
McCutcheon, Thomas P...	Technical advisor, chemical division, foreign service.	Professor of chemistry, University of Pennsylvania.
McDermott, Leo F.	Office manager, central bureau, planning and statistics.	Agent, Library Bureau, New York, N. Y.

MEMBERS OF THE WAR INDUSTRIES BOARD ORGANIZATION

Continued

Name	Position in War Industries Board	Former business
McDonald, Joseph A.	Expert, steel division.	Vice president, Clark Car Co., Pittsburgh, Pa. Washington, D. C.
McGowan, Rear Admiral Samuel.	Navy representative, conservation division.	
McKellar, Wm. D.	Assistant chief, domestic wool section.	Wool buyer, Salt Lake City, Utah.
McKelvey, C. W.	Member legal section.	Member firm Stewart & Schearer, New York, N. Y.
McKenney, Col. Chas. A. .	Army representative, priorities committee.	Consulting engineer, Washington D. C.
McLain, Percy.	Examiner, priorities division.	President and treasurer, J. H. McLain Co., Canton, Ohio.
McLauchlan, Jay C.	Chief, pig-iron section.	Member of firm, Picklands, Mather & Co., Cleveland, Ohio.
McLeary, Frank B.	Staff, central bureau of planning and statistics.	Examiner, the Examination Corporation, New York, N. Y.
McLennan, Donald R.	Chief, nonwar construction section.	Marsh & McLennan, Chicago, Ill.
McWilliams, Chas. M.	Examiner, priorities division.	Lawyer, Houston, Tex.
MacDowell, Charles H. . .	Director of chemical division. . .	President, Armour Fertilizer Works, Chicago, Ill.
Mackall, Paul.	Foreign representative, steel division.	Assistant sales manager, Bethlehem Steel Corporation, Bethlehem, Pa.
MacLaren, Maj. Malcolm. .	Expert, power section.	Professor of electrical engineering, Princeton University.
Macpherson, Frank H.	Member, priorities committee. . .	President and treasurer, Detroit Sulphite Pulp & Paper Co., Detroit, Mich.
Mahoney, J. Bernard.	Deceased; secretary, B. M. Baruch.	Washington, D. C.
Mallalieu, W. E.	Member fire-prevention section. .	General manager National Board of Fire underwriters, New York, N. Y.
Mann, David F.	Expert, steel division.	Sales agent, Pittsburgh Steel, Co., Pittsburgh, Pa.
Manning, John J.	Member, war prison labor and national waste reclamation section.	Secretary, Union Label Trades Department, American Federation of Labor, Washington, D. C.
Mansfield, Wm. L.	Passenger representative, inland traffic section.	Assistant city ticket agent, Chicago, St. Paul, Minneapolis & Omaha Ry., Minneapolis, Minn.
Maness, Wm. H.	Director, war service committees	Chamber of Commerce, Riggs Building, Washington, D. C.
Mapother, Dillon E.	Assistant, paint and pigment section.	Real estate, Louisville, Ky.
Marshall, Ross S.	Staff, central bureau of planning and statistics.	Superintendent, Seaboard Air Line Ry. Co., Norfolk, Va.
Martin, Capt. Andrew Penn.	Secretary, B. M. Baruch at peace conference.	Squire, Sanders & Demsey, Cleveland, Ohio.
Martin, Willard B.	Chief clerk, War Industries Board.	Private secretary to president Central R. R. Co. of New Jersey, Plainfield, N. J.
Mason, Newton E., rear admiral, U. S. Navy, retired.	Priorities committee.	Washington, D. C.
Matlack, John C.	Expert, rubber section.	Treasurer and general manager, Ajax Rubber Co., New York, N. Y.
Maxwell, Lloyd W.	Statistician, division of planning and statistics.	Assistant educational director, Y. M. C. A., New York, N. Y.
Mebane, James K.	Assistant to director textile division.	Secretary and treasurer, Scott-Mebane Manufacturing Co., Graham, N. C.
Meffert, Benj. F.	Associate, cotton goods section. .	Partner of Amory, Browne & Co., New York, N. Y.
Merchant, Ely O.	Expert, pulp and paper division. .	Special agent, Federal Trade Commission, Washington D. C.
Mercury, Chester C.	Charge of reception room, priorities division.	South American representative, Geo. D. Emery Co., mahogany and mines, Boston, Mass.
Merrill, W. H.	Chief, fire prevention section. . .	President, Underwriters Laboratories, Chicago, Ill.
Merryweather, George E. .	Chief, machine tool section.	President, the Motch & Merryweather Machine Co., Cleveland, Ohio.
Merwin, John O.	Expert, electric and power equipment section.	Assistant manager, sales office, Burke Electric Co., New York, N. Y.

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MEMBERS OF THE WAR INDUSTRIES BOARD ORGANIZATION

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Name	Position in War Industries Board	Former business
Meyer, A. J.	Expert, fire prevention section. .	Inspector, Indiana Inspection Bureau, Indianapolis, Ind.
Meyer, Eugene, jr.	Expert, nonferrous metals.	New York, N. Y.
Milbank, Dunlevy.	Expert, facilities division.	Real estate and investments, New York, N. Y.
Miller, Ellis.	Division planning and statistics.	Professor, Johns Hopkins University, Baltimore, Md.
Miller, F. A.	Expert, non war construction section.	Auto Strop Safety Razor Co., New York, N. Y.
Miller, George E.	Expert, facilities division.	Sales manager, Cleveland Electrical & Illuminating Co., Cleveland, Ohio.
Milne, Wm. D.	Expert, fire prevention section. .	Inspector, Underwriters' Bureau of New England, Boston, Mass.
Miltenberger, Capt. Geo. K.	Expert, power section.	Electrical engineer, Union Electric Light & Power Co., St. Louis, Mo.
Minnick, Arthur.	War Industries Board representative in joint office on chemical statistics.	First assistant examiner, United States Patent Office, Washington, D. C.
Mitchell, Andrew W.	Expert, nonwar construction section.	Salesman, Chicago, Ill.
Mitchell, Maj. J. K.	Staff, conservation division.	Philadelphia Rubber Works, Land Title Building, Philadelphia, Pa.
Mitchell, Dr. Wesley C.	Chief, price statistics.	Professor of economics, Columbia University.
Montgomery, Fletcher H.	Expert, felt section.	President, Knox Hat Co., New York, N. Y.
Montgomery, Lieut. Col. R. H.	Army representative on price-fixing committee.	Member of the firm of Lybrand-Ross Bros. & Montgomery, New York, N. Y.
Moody, Herbert R.	Technical advisor, chemicals division.	Professor of industrial chemistry, College of City of New York, N. Y.
Moore, Kilburn.	Expert, priorities division.	Member firm Moore & Goodman, Galveston, Tex.
Morehead, Maj. John M.	Chief, coal and gas products section.	Consulting engineer, Union Carbide & Carbon Corporation and People's Gas Co., Chicago, Ill.
Morgan, Wm. F.	Regional advisor, New York, N. Y.	Attorney, New York, N. Y.
Morgan, Wm. O.	Expert, priorities division.	Do.
Morley, Charles D.	Assistant to chief building material section.	President, Morley Bros. Construction Co., St. Louis, Mo.
Morrisey, James R.	Expert, fire prevention section. .	Engineer, Wisconsin Inspection Bureau, Milwaukee, Wis.
Morrison, John A.	Expert, priorities division.	General agent, Aetna Life Insurance Co., Chicago, Ill.
Morse, Edward N.	Assistant to Mr. S. P. Bush.	Private secretary to C. D. Velie, Minneapolis, Minn.
Morse, Frank W.	Member, special advisory commission on plants and munitions.	Retired, Atlantic City, N. J.
Morss, Everett.	Chief, brass section, member priorities committee.	President Morss & White Co., Simplex Wire & Cable Co., Simplex Electric Heating Co., Boston, Mass.
Morton, Ivon T.	Draftsman, building material section.	Drawing instructor, school commissioners, Anne Arundel County, Berwyn, Md.
Moulton, H. G.	Nonferrous metals, chief abrasives section. Resigned May, 1918.	Treasury Department, Washington, D. C.
Murchison, Capt. Kenneth M.	Emergency construction.	Architect, New York, N. Y.
Murray, William M.	Section on medical industry.	Purchasing agent, Red Cross, Washington, D. C.
Murto, Mary F.	Secretary, Mr. Hugh Frayne.	Washington, D. C.
Musser, James C.	Secretary, clearance office, requirements division.	Law firm, Musser, Kimber, Huffman & Musser, Akron, Ohio.
Naumburg, George W.	Assistant to chief, cotton and cotton linters section.	Member of firm, E. Naumburg & Co. (bankers), N. Y.
Naumberg, Ruth M.	Division planning and statistics. .	1755 R Street NW., Washington, D. C.
Nelson, Frank T.	Member, legal section.	Laucking, Helfman, Laucking, Hammon, lawyers, Detroit, Mich.
Newton, Mary E.	Chief, bureau of personnel, division of business administration.	Appointment division, Census Bureau, Washington, D. C.

MEMBERS OF THE WAR INDUSTRIES BOARD ORGANIZATION

Continued

Name	Position in War Industries Board	Former business
Nibley, Alex.	Expert, lumber section.	Resident manager, Grande Ronde Lumber Co., Perry, Oreg.; Utah-Idaho Sugar Co., Grand Pass, Oreg.
Nichols, Harold W.	Chief, fiber board and containers section, pulp and paper division.	President, Fox Paper Co. and the Chesapeake Pulp & Paper Co., Cincinnati, Ohio.
Nixon, Frederick K.	Expert, foreign wool section.	President, Nixon, Walker & Tracy, New York, N. Y.
Norris, Henry M.	Assistant, machine tool section, Cincinnati.	Bickford Tool Co., Cincinnati, Ohio.
Noyes, P. B.	Fuel Administration representative on requirement division.	Oneida Community (Ltd.), Oneida, N. Y.
Offield, James R.	Expert, priorities division.	President, Bon Air Coal & Iron Corporation, Chicago, Ill.
Oliver, George S.	Regional advisor, Pittsburgh, Pa.	President, the Newspaper Printing Co., Pittsburgh, Pa.
Olmsted, Frederick Law.	Emergency construction.	Olmsted Bros., Landscape Architects and City Planners, Brookline, Mass.
Ordway, Lucius P.	Member priorities commission.	President, Crane-Ordway Co., St. Paul, Minn.
Ormsby, William J.	Assistant section chief, priorities committee.	National bank examiner, Farm Loan Board, Washington, D. C.
Otis, Charles A.	Chief, resources and conversion section.	Member of firm, Otis & Co., Cleveland, Ohio.
Paige, H. Ray.	Assistant, nitrate section.	President, H. Ray Paige & Co., New York, N. Y.
Paine, Catherine.	Expert, division planning and statistics.	Business Administration, Boston, Mass.
Palmer, G. J.	Chief, newspaper section.	Active vice president, the Houston Post, Houston, Tex.
Parker, Edwin B.	Priorities commissioner.	Law firm, Baker, Botts, Parker & Garwood, Houston, Tex.
Parmenter, Vernon E.	Division planning and statistics.	Dennison Manufacturing Co., Framingham, Mass.
Parsonage, Edward E.	Chief, agricultural implement section.	Secretary and manager of the John Deere Wagon Co., Moline, Ill.
Patterson, Albert M.	Chief, foreign wool section.	President, Textile Alliance, New York; Waterloo Woolen Manufacturing Co., Waterloo, N. Y.
Patton, James E.	Associated chief, paint and pigment section.	President, Patton Paint Co., Pittsburgh, Pa.
Paxton, Jesse W.	Priorities examiner.	President, Highland Glove Co., Washington, Pa.
Peabody, Herbert E.	Chief, woolen section.	Sales agent, Shelbourne Mills, New York, N. Y.
Peek, George N.	Commissioner of finished products.	Vice president, Deere & Co., Moline, Ill.
Penfield, Frederick W.	Rating committee, priorities board.	Treasurer, Aetna Powder Co., Chicago, Ill.
Pengnet, Ramsay.	Secretary, silk section.	Secretary, Silk Association of America, New York, N. Y.
Penick, Frank E.	Assistant business manager, purchasing commission.	Auditor of sales in Russia, International Harvester Co., Chicago, Ill.
Pennock, Stanley A.	Pulp and paper division.	Advertising expert, Philadelphia, Pa. and Trenton, N. J.
Penwell, Lewis.	Chief, domestic wool section.	Lewis Penwell Co., Helena, Mont.
Peoples, Admiral C. J., United States Navy.	Requirements division, Navy representative.	Navy Department, Washington, D. C.
Percy, D. C. Steward.	Expert, fire prevention section.	Inspector, Philadelphia Fire Underwriters' Association, Philadelphia, Pa.
Perkins, Thomas Nelson.	Member priorities committee.	60 State Street, Boston, Mass.
Perry, Harry W.	Assistant chief, automotive products section.	Secretary, Good Roads and Motor Truck Committees, New York, N. Y.
Peters, Richard, Jr.	Assistant chief, iron and steel scrap section.	Representative of Rogers, Brown & Co., Philadelphia, Pa.
Phelps, Wm. Walter.	Secretary, price-fixing committee.	Director Wm. Walter Phelps estate (Inc.), New York, N. Y.
Phenix, Capt. Spencer.	Division planning and statistics.	General Staff, Washington, D. C.
Philbrick, Merchant E.	Expert, lumber section.	Secretary, John M. Woods Lumber Co., Memphis, Tenn.

MEMBERS OF THE WAR INDUSTRIES BOARD ORGANIZATION
Continued

Name	Position in War Industries Board	Former business
Phillips, William Vernon . .	Chief, iron and steel scrap section	President, F. R. Phillips & Sons, Philadelphia, Pa.
Phillips, Henry G.	Secretary, priorities board.	Vice president, American Bottle Co., Chicago, Ill.
Picken, Capt. James H. . . .	Assistant to Army representative, price-fixing committee.	Consulting Advertising Service, Chicago, Ill.
Pierce, B. D., jr.	Regional advisor, Bridgeport, Conn.	Director and executive committee, Bridgeport Trust Co.; president, Connecticut Quarries Co., etc., Bridgeport, Conn.
Pierce, Curtis W.	Expert, fire prevention section .	Continental Insurance Co., 83 Maiden Lane, New York City.
Pierce, Dana.do.	Vice president, Underwriters' Laboratories, New York, N. Y.
Pierce, Edward Allen. . . .	General business executive, foreign mission.	Member firm A. A. Housman, 20 Broad Street, New York, N. Y.
Pierce, Frank L.	Expert, fire prevention section	President, What Cheer Mutual Fire Insurance Co., Providence, R. I.
Pierce, Brig. Gen. Palmer E.	Member War Industries Board, Army, representing War Department.	War Department, Washington, D. C.
Pierpont, Lawrence.	Chief clerk, priorities division. .	Poultry raising, Bushfield, Va.
Piez, Charles R.	Emergency Fleet Corporation representative on priorities board.	Vice president and general manager Emergency Fleet Corporation, Philadelphia, Pa.
Pinci, Anthony R.	Assistant to Mr. Frayne, former chief personnel division.	Writer, Munsey, Outlook, Harpers Weekly, etc., Washington, D. C.
Pindell, Robert M., jr. . . .	Executive secretary, hides, leather, and leather goods division.	Vice president Southern Settlement and Development Organization, Baltimore, Md.
Pollak, W. H.	Member legal section.	Law firm, Englehard, Pollak, Pitcher & Stein, New York, N. Y.
Pond, Helen P.	Comfort and welfare committee	Washington, D. C.
Pool, M. B.	Red Cross representative, requirements division.	Red Cross headquarters, Washington, D. C.
Potter, Arthur M.	Assistant chief, automotive products section.	Manager car-order division, Dodge Bros., Detroit, Mich.
Potter, Zenas L.	Expert, central bureau, planning and statistics.	Head of publicity department, National Cash Register Co., Dayton, Ohio.
Powell, Thomas C.	Member priorities committee, chief inland traffic section.	Vice president, Southern Ry. Co., Cincinnati, Ohio.
Prescott, Sherburne.	Assistant to chief, cotton and cotton linters section.	Vice president, Anglo-American Cotton Products Co., New York, N. Y.
Prindle, Arents L.	Secretary, automotive products section.	Assistant to S. A. Miles, New York, N. Y., and Chicago, Ill.
Prosser, E. A.	Associate chief, tanning material and natural dye section (including oils, fats and waxes).	Industrial chemist and salesman, Born Scrymser Co., oils, New York, N. Y.
Purnell, Frank.	Assistant to director of steel supply.	Manager of order and sales departments, Youngstown Sheet & Tube Co., Youngstown, Ohio.
Pyne, Grafton H.	Assistant, steel division.	Member of firm Post & Flagg, New York, N. Y.
Radcliff, George S.	Cut soles expert, hide, leather, and leather goods division.	Member of firm Boston & Lynn Cut Sole Co., Lynn, Mass.
Rakestraw, B. B.	Business manager, division planning and statistics.	Assistant manager, Weinstock, Lubin & Co., Sacramento, Calif.
Ransome, F. H.	Lumber section.	Eastern & Western Lumber Co., Portland, Oreg.
Ransome, R. G.	Assistant to secretary, priorities committee.	Vice president Bostrop Water, Light & Ice Co., Bostrop, Tex.
Rea, Henry R.	Member special advisory committee on plants and munitions.	Retired, Pittsburgh, Pa.
Reay, W. M.	Allied purchasing commission. .	Chief of auditing department, International Harvester Co., Chicago, Ill.
Reed, J. Burns.	Chemicals	Assistant professor of mining, Case School Applied Science, Cleveland, Ohio.

MEMBERS OF THE WAR INDUSTRIES BOARD ORGANIZATION
Continued

Name	Position in War Industries Board	Former business
Reed, Lewis B.....	Assistant to G. N. Peek.....	Vice president, United States Silica Co., Chicago, Ill.
Rees, Thomas M.....	Expert, machine tool section...	Sales engineer, Motch & Merryweather Machine Co., Cleveland, Ohio.
Replogle, J. Leonard.....	Director of steel supply.....	President American Vanadium Co., New York, N. Y.
Reynolds, Stanley M.....	Publicity work.....	Committee on Public Information, Washington, D. C.
Rhoades, Philo B.....	Assistant warehouse section, steel division.	Manager warehouses the Bourne-Fuller Co., Cleveland, Ohio.
Rice, Capt. Willis B.....	Army representative, joint office on chemical statistics.	Law firm Duell, Warfield & Duell, New York, N. Y.
Richardson, David Robt...	Expert, priorities division....	Secretary, Richardson & Boynton Co., New York, N. Y.
Richardson, Nicholas	Expert, fire prevention section.	Inspecting Engineer, Underwriters Bureau of New England, Boston, Mass.
Richardson, Ralph I.	Accountant, steel division....	Chief clerk, Cambria Steel Co., Johnstown, Pa.
Riddle, Capt. Geo. W.	Temporary assistant to director of building material division.	Construction Division, U. S. Army, Washington, D. C.
Riley, Charles W.	Assistant, facilities division....	Attorney, Akron, Ohio.
Riley, Maj. J. W.	Member war prison labor and national waste reclamation section.	Adjutant General's office.
Rippin, Lieut. J. Y.do.....	Reclamation Division, U. S. Army.
Ritchie, Albert C.	General counsel, War Industries Board.	Attorney general of Maryland, Baltimore, Md.
Ritter, William M.	Assistant to committee on finished products (certifying officer).	President, W. M. Ritter Lumber Co., Columbus, Ohio.
Robbins, Walter	Assistant to committee on finished products; chief, electric and power equipment section.	Vice president, Wagner Electric & Manufacturing Co., St. Louis, Mo.
Robinson, William C.	Expert, fire prevention section.	Vice president, Underwriters' Laboratories, Chicago, Ill.
Rogers, Charles A.	Chief, harness and personal equipment section, leather division.	Retired, Hartford, Conn.
Rogers, Chilton L.	Auditor, division of business administration.	Senior accountant, Baker, Vawter & Wolf, Chicago, Ill.
Root, Charles T.	Chief, periodical section, pulp and paper division.	United Publishers Co., director, New York, N. Y.
Roper, Frank A.	Staff, central bureau of planning and statistics.	Farm Economics Department, Department of Agriculture, Reporter, New York, N. Y.
Rosenberg, William S.	Reporter.....	Vice president and treasurer, Powers-Weightman-Rosengarten Co., Philadelphia, Pa.
Rosengarten, A. G.	Chief, miscellaneous chemical section.	War Department, Washington, D. C.
Rosensohn, Maj. S. J.	Member war prison labor and national waste reclamation section.	
Ross, Harry C.	Assistant to chairman, conservation division.	Care of F. P. Luther Co., railway equipment, Chicago, Ill.
Rossiter, William S.	Staff, central bureau of planning and statistics.	President Rumford Printing Co., Concord, N. H.
Rossiter, W. T.	Assistant to chief, resources and conversions section.	Vice president and general manager of the Cleveland Builders' Supply Co., Cleveland, Ohio.
Routsong, Ralph C.	Expert, central bureau of planning and statistics.	Welfare director, National Cash Register Co., Dayton, Ohio.
Rowbotham, George B. ...	Chief, belting section, hide, leather, and leather goods division.	President, Bay State Belting Co., Boston, Mass.; Southern Belting Co., Atlanta, Ga., etc.
Rowland, Joseph W.	Assistant to chief, rubber section	Office manager, Fisk Rubber Co., Chicopee Falls, Mass.
Rullman, Chas. Phillip....	Domestic wool section.....	Lambert Huntington Co., 79 Fifth Avenue, New York, N. Y.
Rumbaugh, R. L.	Expert, fire prevention section.	Inspector, Western Sprinkler Risk Association, Chicago, Ill.
Sadler, Capt. Harry M. ...	Examiner, Army section, priorities committee.	Manager, mail order department, Spear & Co., Pittsburgh, Pa.

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MEMBERS OF THE WAR INDUSTRIES BOARD ORGANIZATION *Continued*

Name	Position in War Industries Board	Former business
Saeger, Wilford C.	Member legal section.	Law firm of Bulkley, Hauxhurst, Saeger & Jamieson, Cleveland, Ohio.
Salomon, Joseph.	Secretary, industrial adjustment committee, priorities division.	Lawyer, Washington, D. C.
Sanford, Hugh W.	Chief, ferro alloys section.	Treasurer and general manager, Sanford-Day Iron Works, Knoxville, Tenn.
Sargent, Murray.	Chief, hardware and hand tool section.	Secretary, Sargent & Co., New Haven, Conn.
Sawyer, Capt. Daniel E.	Chief of projectile, steel rails, etc., section.	Salesman, Block Maloney & Co., Chicago, Ill.
Sawyer, Harry A.	Expert, chemical statistics.	Assistant chemical engineer, American University, Washington, D.C.
Schaaf, F. A.	Examiner, priorities division. . .	Adam Schaaf, Chicago, Ill.
Schaffer, Herbert Allen.	Assistant to director, building material division.	Member of firm, Harrison & Schaffer, Easton, Pa.
Schlosser, Alexander L.	Assistant and secretary to H. B. Swope.	Assistant and secretary to H. B. Swope, New York World.
Schmidt, John C.	Chief, chain section.	President, Schmidt & Ault Paper Co., York, Pa.
Schmuckler, Jacob.	Nonferrous metals section.	Care J. J. Campbell, 1735 Sedwick Avenue, Morris Heights, N. Y.
Schneider, Albert.	Reporter.	Reporter, New York, N. Y.
Schoelkopf, J. F.	Chief, artificial and vegetable dye section.	Vice president, National Aniline & Chemical Co., Buffalo, N. Y.
Schravesende, P. B.	Assistant chief, agricultural implement section.	President, Grand Rapids School Equipment Co., Grand Rapids, Mich.
Schubert, Frank H.	Expert, electric and power equipment section.	Production manager, Wheeler Condenser & Engineering Co., Cataret, N. J.
Scott, Frank A.	Chairman munitionsboard, chairman War Industries Board, Aug. 1 to Nov. 1, 1917.	Vice president, Warner-Swasey Co., Cleveland, Ohio.
Scott, John W.	Director of textile and rubber division	Member of firm, Carson, Pirie, Scott & Co., Chicago, Ill.
Scott, Leland.	Examiner, inland traffic section.	Traffic expert, Traffic Association Coal Co., Birmingham, Ala.
Scott, Rufus W.	Associate chief, knit-goods section.	Member of firm, Wm. F. Taubel (Inc.), Riverside, N. J.
Scott, W. G.	Disbursing officer, division of business administration.	Examiner, Naturalization Service, Department of Labor.
Seaman, Irving.	Expert, priorities division.	Secretary, W. D. Seaman, Milwaukee, Wis.
Selden, Ernest L.	Statistician, division of planning and statistics	Accountant, Oliver Mining Co., Hadlyme, Conn.
Selfridge, Edward A.	Expert, lumber section.	President, Northwestern Redwood Co., Willits, Calif.
Sever, Maj. Geo. F.	Expert, power section.	Professor of electrical engineering, Columbia University.
Seward, George N.	Statistician, division of planning and statistics.	Accountant and efficiency man, Minneapolis, Minn.
Shaw, A. W.	Chairman conservation division.	President, A. W. Shaw Co., Chicago, Ill.
Shaw, Maj. C. H.	Expert, power section.	Electrical engineer, Minnesota Power Co., Eveleth, Minn.
Shaw, George M.	Member advertising committee on plants and munitions.	Mechanical engineer, Standard Steel Car Co., Butler, Pa.
Shaw, Jean M.	Expert, hardware and hand-tool section.	Vice president, secretary, and general manager, Geo. H. Adams & Co., Hill, N. H.
Shepard, William P.	Assistant, conservation division	Professor of romance languages, Hamilton College.
Sherman, Karl W.	Assistant chief, jute, hemp, and cordage section.	Manager, hair department, Morris & Co., Chicago, Ill.
Shidle, Geter C.	Expert, steel division.	Selling agent, Pittsburgh office, La. Bell Iron Works, Steubenville, Ohio.
Shotwell, Edward C.	Expert, hides, leather, and leather goods division.	Member of firm, S. H. Shotwell & Sons, Gloversville, N. Y.
Sieenthal, Myrtle M.	In charge of conferences and reports, secretary's office.	Washington, D. C.
Simpson, Lieut. Col. F. F.	Chief, section of medical industry	Surgeon, Pittsburgh, Pa.

MEMBERS OF THE WAR INDUSTRIES BOARD ORGANIZATION

Continued

Name	Position in War Industries Board	Former business
Skinner, William.....	Chief, silk section.....	President, Wm. Skinner & Sons, New York, N. Y.
Sloan, Harry M.....	Assistant to chief, nonwar construction section.	Assistant to Federal manager, Chicago Rock Island & Pacific R. R. Co., Chicago, Ill.
Small, A. R.....	Expert, fire prevention section..	Vice president, Underwriters' Laboratories, Chicago, Ill.
Smith, Arthur H.....	Associate chief, wood chemicals section.	Assistant secretary, Wm. S. Gary & Co., New York, N. Y.
Smith, A. Homer.....	Assistant chief, section of medical industry.	H. K. Melford Co., Philadelphia, Pa.
Smith, Austin D.....	Assistant, warehouse section, steel division.	Superintendent of warehouse, David H. Smith & Sons, Brooklyn, N. Y.
Smith, Charles Henry....	Association chief, fire prevention section.	Vice president, Blackstone Mutual Fire Insurance Co., Providence, R. I.
Smith, E. A.....	Secretary, lumber section.....	Wm. Cady Lumber Co., McNary, La.
Smith, George F.....	Chief, flax products section....	President, Smith & Dove Manufacturing Co., Andover, Mass.
Smith, Harold O.....	Assistant to chief, automotive products section.	President, J. & D. Tire & Rubber Co., Charlotte, N. C.
Smith, Lewis Reading....	Expert steel division.....	Salesman, Matthew Addy Co., Philadelphia, Pa.
Smithers, John F.....	Private secretary to B. M. Baruch	Attorney at law, Providence, R. I.
Snowden, Howard J.....	Member advisory commission on plants and munitions.	Draftsman, the Baldwin Locomotive Works, Philadelphia, Pa.
Sowers, W. J.....	Southern lumber administrator.	Member of firm, Majors-Sowers Sawmill Co., Epley, Miss.
Spillman, Dr. W. J.....	Member war prison labor and national waste reclamation section.	Associate editor, the Farm Journal, Washington, D. C.
Staley, Homer F.....	Technical advisor on ceramics, chemical division.	Technical director, Standard Sanitary Manufacturing Co., Pittsburgh, Pa.
Stamp, Capt. Charles E....	Assistant chief, crane section...	President and treasurer, C. E. Stamp Co., Cleveland, Ohio.
Stanley, Capt. W. W.....	Expert, power section.....	Assistant to president, Wasson Piston Ring Co., New Brunswick, N. J.
Starrett, Col. W. A.....	Chairman emergency construction committee.	Starrett & Van Vleet, architects, New York, N. Y.
Stein, C. S.....	Member legal section.....	Law firm, Englehard, Pollack, Pitcher & Stein, New York, N. Y.
Steinert, Jerome.....	Expert, fire prevention section..	National Board of Fire Underwriters, 78 William Street, New York, N. Y.
Stephenson, Bertram S....	Expert, steel division.....	Resident agent, M. A. Hanna & Co., Pittsburgh, Pa.
Stewart, Oswald W.....	Expert, fire prevention section..	Engineer, Manufacturers Mutual Fire Insurance Co., Providence, R. I.
Stewart, W. W.....	Staff, division of planning and statistics.	Professor of economics, Amherst College.
Stockdale, Raymond D....	Secretary to W. M. Ritter.....	Secretary to W. M. Ritter, W. M. Ritter Lumber Co., Columbus, Ohio.
Stoddard, Lawrence J.....	Expert, hardware and hand-tool section.	Sales manager, gage division, Greenfield Tap & Die Corporation, Greenfield, Mass.
Stone, George C.....	Expert, nonferrous metals section	Metallurgist, New Jersey Zinc Co., New York, N. Y.
Stout, Charles F. C.....	Director of hides, leather, and leather goods section.	Partner, John R. Evans & Co., Philadelphia, Pa.
Stroock, Sylvan I.....	Chief, felt section.....	Member of firm, S. Stroock & Co., New York, N. Y.
Stuart, Henry C.....	Member price-fixing committee.	Ex-governor of Virginia.
Styles, Maxwell A.....	Assistant to director, building material division.	Purchasing agent, Aberthaw Construction Co., Boston, Mass.
Summers, Leland L.....	Technical advisor, and chairman foreign mission.	L. L. Summers & Co., New York, N. Y.
Sweet, Edwin F.....	Member war prison labor and national waste reclamation section.	Assistant secretary, Department of Commerce.
Swope, Herbert Bayard....	Associate member of War Industries Board, assistant to chairman.	City Editor, New York World.

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MEMBERS OF THE WAR INDUSTRIES BOARD ORGANIZATION

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Name	Position in War Industries Board	Former business
Talmage, Lieut. J. B.	Secretary emergency construction section.	Crowell-Lundoff-Little Co., general contractors, Cleveland, Ohio.
Taussig, Dr. F. W.	Member of price-fixing committee.	Chairman United States Tariff Commission.
Taylor, H. K.	Staff, conservation division. . . .	Manager, Philadelphia office, Dennison Manufacturing Co.
Taylor, Horace F.	Lumber section.	Taylor & Create, Buffalo, N. Y.
Taylor, Irving H.	Staff, resources and conversion section.	Traffic department, Michigan Alkali Co., Wyandotte, Mich.
Taylor, Capt. M. N.	Navy representative, requirements division.	Navy Ordnance, Washington, D. C.
Taylor, Tullie V.	Facilities division.	Buckeye Steel Casting Co., Columbus, Ohio.
Taylor, William A.	Assistant, optical glass and instrument section.	Student, Yale University: residence, New York, N. Y.
Templeton, Allen A.	Regional advisor, Detroit. . . .	Manufacturer, Detroit, Mich.
Thomas, Clinton G.	Expert, steel division.	President, the Western Reserve Steel Co. Warren, Ohio.
Thomas, Percy H.	Expert, power section.	Consulting electrical engineer, New York, N. Y.
Thomas, Wm. R.	Division planning and statistics	124 Eleventh Street SE., Washington, D. C.
Thompson, Frank E.	Expert, steel division.	Superintendent, order department, Cambria Steel Co., Johnstown, Pa.
Thompson, Warren S.	Expert, central bureau planning and statistics.	Professor, University of Michigan.
Thurston, E. Coppe.	Assistant to chief, nonferrous metals section.	Engineer, with Pope Yeatman, New York, N. Y.
Tim, John F.	Associate chief, alkali and chlorine section.	Attorney, special counsel, Diamond Alkali Co., Pittsburgh, Pa.
Tinsley, Maj. A. M.	Expert, power section.	Manager, Missouri Public Utilities Co. and Cape Girardeau-Jackson Interurban Ry. Co., Cape Girardeau, Mo.
Torrence, Robert M.	Chief, chemical glass and stone-ware section.	Secretary, Highland Glass Co., Washington, Pa.
Townsend, John R.	Associate section chief, sulphur, pyrites, and alcohol sections.	Executive engineer, Sanderson & Porter, New York, N. Y.
Trigg, Ernest T.	Regional advisor, Philadelphia, Pa.	Vice president and general manager, John Lucas & Co., Philadelphia, Pa.
Tripp, Chester D.	Associate chief, ferro-alloys section.	Vice president, Miami Metals Co., Chicago, Ill.
Turkington, Everett E. . . .	Expert, fire prevention section. . .	Electrical engineer, Associated Factory Mutual Insurance Co., Boston, Mass.
Tucker, Maj. Samuel A. . . .	Technical advisor, chemicals division.	Professor, Columbia University, New York, N. Y.
Turner, Spencer.	Chief, cotton goods section. . . .	Member of firm, Turner-Halsey Co., New York, N. Y.
Turpin, Upshur F.	Assistant to director building material division.	Designing engineer, the Dayton-Wright Aeroplane Co., Dayton, Ohio.
Tuttle, M. C.	Emergency construction committee.	Executive officer, Aberthaw Construction Co., construction engineers, Boston, Mass.
Ulrich, Ethel E.	Assistant chief, harness and personal equipment section.	Smith-Worthington Co., Hartford, Conn.
Van Deventer, Harry B. . . .	Examiner, priorities division. . . .	Professor of Latin, University of Pennsylvania.
Van Doren, Durand H.	Member, legal section.	Lawyer, Raymond, Mountain, Van Blarcom & Marsh, Newark, N. J.
Vanduzer, H. B.	Pacific coast lumber administrator.	Chairman Fir Production Board, Portland, Oreg.
Vaughan, Samuel M.	Chairman, special advisory committee on plants and munitions.	Senior vice president, Baldwin Locomotive Works, Philadelphia, Pa.
Vaughan, Victor C.	Member, advisory board on medicinal agents.	Dean, medical department, University of Michigan, Ann Arbor, Mich.
Venard, Wm. S.	Statistician, division planning and statistics.	Pacific Tel. & Tel. Co., San Francisco, Calif.
Vogel, August H.	Regional advisor, Milwaukee, Wis.	Vice president, Pfister-Vogel Leather Co., Milwaukee, Wis.

MEMBERS OF THE WAR INDUSTRIES BOARD ORGANIZATION

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Name	Position in War Industries Board	Former business
Vogel, Fred A.	Expert, hide, leather, and leather goods division.	General manager, Pfister-Vogel Leather Co., Milwaukee, Wis.
Wadleigh, Francis R.	Staff, division of planning and statistics.	Consulting engineer, Blair & Co., New York, N. Y.
Walker, Charles R.	Assistant to chief, fiber board and container section.	Assistant to President Fox Paper Co., Lockland, Ohio.
Walker, F. W.	Assistant to director building material division.	Secretary, Association of Tile Manufacturers, Beaver Falls, Pa.
Walker, Reginald D.	Executive assistant, wool chemical section.	Engineer, L. J. Husted Co., Kansas City, Mo.
Walz, Andrew.	Assistant, nonferrous metals section.	Consulting mining engineer, Guggenheim Bros., New York, N. Y.
Ware, J. E.	Staff, conservation division.	Member of firm, Maesel-Ware Co., New York, N. Y.
Ware, Robert D.	Assistant, belting section.	Salesman, Bay State Belting Co., Boston, Mass.
Waring, Lieut. Wm. E., jr. .	Assistant to Secretary price fixing committee.	Baltimore, Md.
Waterman, John H.	Chief, charge machine department, electrical and power equipment section.	Engineer, Allis Chalmers Manufacturing Co., Milwaukee, Wis.
Weaver, Herbert H.	Expert, steel division.	With Citizens Heat, Light & Power Co., Johnstown, Pa.
Webb, Stuart W.	Regional advisor, Boston.	President, Clinton Wire Cloth Co., Boston, Mass., etc.
Weber, Orlando F.	Assistant nonferrous metals section.	Eugene Meyer, jr. Co., New York, N. Y.
Webster, Arthur L.	Expert, hides and skins section.	A. L. Webster & Co., Chicago, Ill.
Webster, Benjamin.	Executive assistant, chemical division.	Engineer with Albert Webster, New York, N. Y.
Webster, Hosea.	Expert, facilities division.	Engineer and sales manager, Babcock-Wilcox Co., New York, N. Y.
Weeks, Marian F.	Assistant to chief clerk, War Industries Board.	Wellesley Hills, Mass.
Wehle, L. B.	Member legal section.	Law firm Wehle & Wehle, Louisville, Ky.
Weidlein, Edward R.	Technical advisor, chemical division.	Acting director of Mellon Institute, Pittsburgh, Pa.
Weiss, L. S.	Member legal section.	Lawyer, Cleveland, Ohio.
Weld, C. Minot.	Representative Bureau of Mines on ferro-alloys section.	Chief, War Minerals Bureau, Bureau of Mines, Washington, D. C.; residence, New York, N. Y.
Wells, E. R.	Consulting engineer, electrical and power equipment section.	Chief Mechanical Engineer, J. A. White & Co., New York, N. Y.
Wells, Arthur E.	Associate chief, acids and heavy chemical section, sulphur, pyrites, and ethyl alcohol sections.	With United States Bureau of Mines.
Wendt, Alfred.	Assistant chief, silk section.	Partner, Wendt Bros., New York, N. Y.
Westheimer, Leo F.	Resources and conversion section.	President, Ferdinand Westheimer & Sons Co., Cincinnati, Ohio.
Wetherell, Lawrence H. . .	Expert, hardware and hand-tool section.	Vice president and treasurer, Wetherell Bros. Co., Boston, Mass.
Weymouth, Frederick A. . .	Expert, steel division.	Sales metallurgical engineer, Bethlehem Steel Corporation, South Bethlehem, Pa.
Wheeler, Andrew.	Chief, warehouse section, steel division.	Senior partner, Morris Wheeler & Co., Philadelphia, Pa.
Wheeler, George R.	Assistant chief, boot and shoe section.	Interests in several lumber and orchard companies, Cumberland, Md.
White, Carl H.	Staff, conservation division.	Vice president, Jos. Richard Co., New York, N. Y.
Whitin, Dr. E. Stagg.	Member war prison labor and national waste reclamation section.	Chairman executive committee, National Commission on Prisons and Prison Labor.
Whiteside, Arthur D.	Expert, foreign wool section.	President, National Credit Office, New York, N. Y.
Whitmarsh, T. F.	Requirements division, Food Administration representative.	Francis H. Liggett Co., Twenty-seventh Street and North River, New York, N. Y.
Whitmore, Brewer G.	Dean of students, employment management courses.	Professor of English and Government, Harvard University.

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MEMBERS OF THE WAR INDUSTRIES BOARD ORGANIZATION

Continued

Name	Position in War Industries Board	Former business
Whitney, A. M.	Staff, conservation division . . .	Treasurer and trustee, Massachusetts Lighting & Power Co., Boston, Mass.,
Whitsit, Capt. Lyle A. . . .	Expert, power section.	Engineer, United States Forest Service, Washington, D. C.
Whittier, Carl S.	Central bureau of planning and statistics.	Manager, Foreign Trade Bureau, American Cypress Co., New York, N. Y.
Wigglesworth, Albert W. . .	Machine tool section.	Hill-Clarke Co., Chicago, Ill.
Wildman, M. S.	Staff, division of planning and statistics.	Head of economics department, Leland Stanford Junior University.
Wilhoit, Frederic S.	Expert, electrical and power equipment section.	Manager, printing and equipment division, the Cutler-Hammer Manufacturing Co., Milwaukee, Wis.
Wilkins, John F.	Chief, stored materials section . .	Treasurer, Wilkins Securities Corporation, Washington, D. C.
Williams, Ben P.	Expert, steel division.	Vice president, Hickman, Williams Co., St. Louis, Mo.
Williams, Lieut. Edward A.	Ordinance department, U. S. Army, associated alkali and chlorine section.	Starkweather, Williams & Co., Providence, R. I.
Williams, Harrison.	Member, facilities division. . . .	Director of various companies, New York, N. Y.
Williams, Leonard W. . . .	Assistance chief, pig iron section	Vice president and treasurer, Park & Williams (Inc.), Philadelphia, Pa.
Williams, Maj. Seth.	Marine Corps representative requirements division.	Navy Department, Washington, D. C.
Williamson, Capt. Stanley. .	Assistant to commissioner finished products.	Lawyer, Land Title Building, Philadelphia, Pa.
Willson, Sidney L.	Chief, manufacturing section, pulp and paper division.	Vice president, Graham Paper Co., St. Louis, Mo.
Wilson, Creede W.	Secretary of knit goods section . .	Superintendent of agents, Mutual Life Insurance Co. of New York, Cumberland, Md.
Wilson, John P.	Assistant to chief to tin section. .	Assistant manager, National Lead Co., New York, N. Y.
Winkleman, Richard. . . .	Draftsman, building materials division.	Architect, 1401 Webster Street, Washington, D. C.
Winqvist, Raymond V. . . .	Chief reporter.	Stenotypist, Navy Department; residence, Rockford, Ill.
Winton, C. Y.	Lumber section.	Security Building, Minneapolis, Minn.
Winslow, Dr. Charles H. . .	Member war prison labor and national waste reclamation section.	Assistant director of research, Federal Board for Vocational Education.
Wisner, Frank.	Lumber section.	Eastman-Gardner Lumber Co., Laurel, Miss.
Wisner, Newlin M.	Wood chemical section.	Thomas Mattocks Son's Co., Trenton, N. J.
Witherspoon, Herbert. . . .	Regional advisor, Seattle.	Vice president, Spokane & Eastern Trust Co., Spokane, Wash.
Withey, Percy King.	Statistician, steel division.	Sales department, Lackawanna Steel Co., Lackawanna, N. Y.
Wolman, Leo.	Staff, division of planning and statistics.	Instructor, Johns Hopkins University.
Wood, Earle D.	Inspector, fire prevention section	Underwriters' Association of New York State, Syracuse, N. Y. (inspector).
Wood, Ezra F.	Member advisory committee on plants and munitions.	First vice president and consulting engineer, International Nickel Co., New York, N. Y.
Wood, Harold G.	Associate chief, tanning material and natural dye section (including oils, fats, and waxes).	Examiner of surveys and national forest examiners, United States Forest Service.
Wood, Leslie D.	Expert, fire prevention section. .	Inspector, Michigan Inspection Bureau, Detroit, Mich.
Wood, Richard L.	Assistant to director, chemical division.	Richard L. Wood Co., Buffalo, N. Y.
Woolfolk, William G.	Chief, sulphur, pyrites, and alcohol sections.	Manager, Chicago office, Sanderson & Porter, engineers and contractors.
Woolley, Clarence M.	Priorities board, war trade representative.	President, American Radiator Co., New York, N. Y.

MEMBERS OF THE WAR INDUSTRIES BOARD ORGANIZATION

Continued

Name	Position in War Industries Board	Former business
Woolson, Prof. Ira A.	Advisory engineer, building materials division.	Consulting engineer, National Board Fire Underwriters, New York, N. Y.
Worcester, Chas. H.	Lumber committee.	1409 Y. M. C. A. Building, Chicago, Ill.
Wyman, Henry A.	Member, brass section.	Attorney, Boston, Mass.
Wynegar, Howard L.	Assistant, nonwar construction section.	Vice president, Continental Guaranty Corporation, New York, N. Y.
Yeatman, Pope.	Chief, nonferrous metals section.	Consulting engineer, New York, N. Y.
Young, Neil.	Expert, electric and power equipment section.	Assistant manager, industrial department, Westinghouse E. & M. Co., East Pittsburgh, Pa.
Yuengling, George W.	Executive assistant, miscellaneous commodities section.	Secretary, Globe Indemnity Co. New York, N. Y.
Zane, A. V., rear admiral U. S. Navy, retired.	Priorities committee.	Washington, D. C.

APPENDIX VII

WAR SERVICE COMMITTEES OF THE CHAMBER OF COMMERCE OF THE UNITED STATES, AND MEMBERS THEREOF

WAR SERVICE EXECUTIVE COMMITTEE

Harry A. Wheeler, chairman.
Joseph H. Defrees, vice-chairman.
A. C. Bedford.
William Butterworth.
W. L. Clause.
L. S. Gillette.
John H. Fahey.
W. H. Manss.

ACCOUNTING

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A. P. Richardson, secretary.
W. Sanders Davies.
Chas. S. Ludlam.
Robt. H. Montgomery.
Charles H. Nau.
Henry A. Niles.
J. E. Sterrett.
Arthur W. Teele.

ASBESTOS AND MAGNESIA

George D. Crabbs, chairman.
C. J. Stover, secretary.
W. A. Macan.
Richard V. Mattison, jr.
C. B. Jenkins.
S. R. Zimmerman.

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John N. Willys.
H. H. Rice.
George M. Graham.
Alfred Reeves.

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Earl C. Anthony.
Chas. Collier.
A. E. Mitzel.
A. E. Maltby.
F. E. Murphy.
Dayton Keith.
J. H. McAlman.
Geo. D. McCutcheon.
O. P. Tyler.
Fred J. Caley.
Chas. M. Browne.
Finley L. MacFarland.

BABY VEHICLES

O. W. Siebert, chairman.
G. A. Keyworth.
Frank Wissig.
Hugh Hill.
P. C. Kendall.
W. S. Ferris.

BAGS (BURLAP AND COTTON)

Executive Committee
Albert F. Bemis, chairman.
Everett Ames.

BAGS—Continued

Executive Committee—Con.

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E. K. Ludington.
G. D. Adams.
E. W. Mente.
J. B. Morgan.

Subcommittee on Cotton

Benjamin Elsas, chairman.
Geo. N. Roberts.
Benj. D. Riegel.
F. P. Mann.
A. S. Bowen.

Subcommittee on Burlap

A. V. Phillips, chairman.
W. N. Morice.
J. W. Falconer.
J. R. Dewitt.
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Frank R. Shepard, chairman.
Jay Burns.
Robt. L. Corby.
Wm. Friehofer.
John F. Hildebrand.
S. F. McDonald.
Wm. M. Regan.
Paul Schulze.
B. Howard Smith.
Gordon Smith.
Geo. S. Ward.
A. L. Taggart.

BALL BEARINGS AND STEEL BALLS

W. M. Nones, chairman.
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Isaac Andrews.

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Joseph Gibson.
A. Edlis.
Christ Kohler.
J. E. Miller.
Martin Hanson.
W. W. Page.
J. V. Reed.
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M. O. Overstreet.
M. H. Stuart.
J. H. Schlegel.
J. R. Jarrell.
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John R. Garside.
L. H. Downs.
Walter J. Hallahan.
Sol Wile.
J. Frank McElwain.
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BRASS AND COPPER TUBES
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J. S. Rousmanniere, secre-
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W. D. Anderson.
J. Arthur Atwood.
Howard Baetjer.
Walter C. Bayliss.
Harry H. Blunt.
Bertram H. Borden.
Arthur T. Bradlee.
W. Irving Bullard.
J. W. Cannon.
B. B. Comer.
J. W. Cone.
Philip Dana.
George A. DeForest.
B. H. Bristow Draper.
F. C. Dumaine.
H. R. Fitzgerald.
B. E. Geer.
C. L. Gilliland.
Henry S. Howe.
George H. Lanier.
J. H. Ledyard.
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Victor M. Montgomery.
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C. S. Martin.
C. E. Bedwell.
W. G. Noyes.
Wm. Scott.
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Theo. F. Hagenow.
Charles H. Huhn.
Samuel C. Henry.
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—Continued*Subcommittee on Dress Fabrics*

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Samuel D. French.
Murray Brown.
Fred T. Howard.

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D. J. Callaghan.
J. H. Emery.
A. Chas. Wilson.

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Gaylord W. Gillis.
I. M. Parsons.

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Robert K. Sheppard.
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W. W. Mumma.
J. M. Woodward.
H. W. Bliven.
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Herman Plaut.
H. G. Lewis.
C. E. Corrigan.
F. W. Hall.
H. W. McCandless.
R. W. Seabury.
W. H. Thornley.
H. D. Betts.
Chas. L. Eidlitz.
D. H. Murphy.
Wallace S. Clark.
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I. B. Houghton.
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Alex. C. Humphreys.
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Ad. Schuetz.
F. W. Gage.
A. D. Sheridan.
H. C. C. Stiles.
S. E. Blanchard.
J. C. Buckbee.
Don Seitz.
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E. A. Gilbert.
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